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HYDROGEOLOGICAL ASSESSMENT

OF THE

CLOSED COBOCONK LANDFILL

Report Prepared for:
Waste Management Branch

Report prepared by:
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EXECUTIVE SUMMARY

The closed Coboconk Landfill is a small (0.5 hectare) landfill which was owned by the Township of Sommerville and was closed in 1974. The landfill was operated for most of its life as an open-face dump. Refuse was dumped off a bedrock scarp onto a lower area and burning of refuse was carried out on a regular basis.

The site is located on a flat lying, poorly drained, limestone plain. The refuse was placed directly on top of fractured limestone bedrock which forms the most important water supply aquifer for residents in the area. The nearest surface water courses to the landfill are the Gull River, 500 m to the west and a drainage ditch in the bottom of the Cedarhurst Quarry, 400 m to the north.

The results of this hydrogeological investigation indicate that landfill leachate presently has negligible impact on ground water quality in the limestone aquifer. The leachate tested in the study has exceptionally low concentrations compared to other Ontario landfills. This is probably due to the small size of the landfill, the age of the waste, and the fact that most of the refuse was burned. Dilution of leachate with clean ground water flowing beneath the landfill is also occurring. There are no detectable impacts on local residential wells related to leachate effects. The reasons for this are probably the dilute nature of the leachate, and additional dilution and attenuation along the ground water flow path. Based on our understanding of the landfill history and ground water flow system there is no reason to expect that leachate impacts will become worse in the future.

No leachate impacts on surface water quality were detected in this study. No methane gas concentrations were detected in the landfill and off-site methane gas migration appears highly unlikely based on our understanding of the hydrogeological setting.

Based on the findings of this hydrogeological assessment we have recommended that no remedial measures are required to contain or control leachate or methane gas at this site. Furthermore, there is no apparent need for monitoring of ground water, surface water or methane gas.

1.0 INTRODUCTION

Gartner Lee Limited (GLL) was retained by the Ontario Ministry of the Environment (MOE) (P.O. #A-05690) in August 1988 to carry out a hydrogeological assessment of the closed Coboconk Landfill.

As outlined in the MOE Request for Proposals, this hydrogeological assessment represents part of Phase III of a MOE program designed to investigate and monitor all active and closed waste disposal sites in the Province. The aim of this program is to ensure that all pertinent information regarding waste disposal sites is available for the definition of both existing impacts and the potential for future impacts on humans or the environment. Once existing or potential impacts have been identified, remedial options can be investigated and implemented where necessary.

The program has been subdivided into four separate phases:

PHASE I:	the creation and continual updating and verification of an inventory listing all active and closed waste disposal sites in the Province;
PHASE II:	preliminary file and field investigations to classify and establish a priority for further investigation;
PHASE III:	investigations and monitoring to assess site hydrogeology as well as surface and ground water contamination potential at selected sites;
PHASE IV:	investigations of remedial options at sites identified during Phase III.

The impact assessments and identification of the contamination problems related to landfills involves both surface and ground water investigations. An accurate definition

of site hydrogeology is necessary due to the Ministry's concern for the potential for hidden problems which may be affecting ground water resources.

The Phase III study described herein forms the basis for determining whether or not detailed investigations of remedial options are required at this site during Phase IV of the program.

The purpose of this Phase III study on the closed Coboconk Landfill is to define any impacts of risks the site may pose to human health and safety or the environment and to recommend any remedial measures or additional work necessary to remove or minimize such impacts or risks.

The four main objectives of this Phase III investigation are as follows:

a) to assess any existing or potential future landfill leachate impacts on ground water and the local aquifers;

b) to assess any existing or potential future landfill leachate impacts on surface water;

c) to assess any existing or potential future landfill gas impacts;

d) to determine the need for site improvements such as remedial measures or monitoring.

2.0 BACKGROUND AND LANDFILL HISTORY

The closed Coboconk Landfill is located on parts of Lots 35 and 36 of Concession Fronting on River, Township of Somerville, Victoria County, Ontario. The site is about 0.4 km southeast of the Village of Coboconk as shown on Figure 1. The area of refuse disposal is about 0.5 hectares.

Information on the history of this site was obtained from a review of MOE files. Photocopies of pertinent documents are included in Appendix I for reference.

The landfill site was owned and operated by the Township of Somerville. The date when landfilling commenced is not known but review of historical aerial photographs indicate that the site was well established in 1969. The site received a Provisional Certificate of Approval for a Waste Disposal Site (No. 321603) in November 1971. The site was closed in August 1974 due to an unsuitable hydrogeological setting and a lack of available cover material on-site.

The property on which the landfill is located was sold to a Mr. G. Mitchell in 1986 and was resold to Mr. R. Boyce in 1987. We understand that both Mr. Mitchell and Mr. Boyce were aware of the waste disposal site prior to purchasing the property.

The landfill received wastes from Sommerville Township, the Village of Coboconk, and Bexley Township. It serviced a population of about 1,000 to 1,300 people and is reported to have received about 2.5 tons/day of wastes.

The composition of the wastes are estimated to be as follows:

60% domestic
25% commercial
5% industrial
4% agricultural
6% other

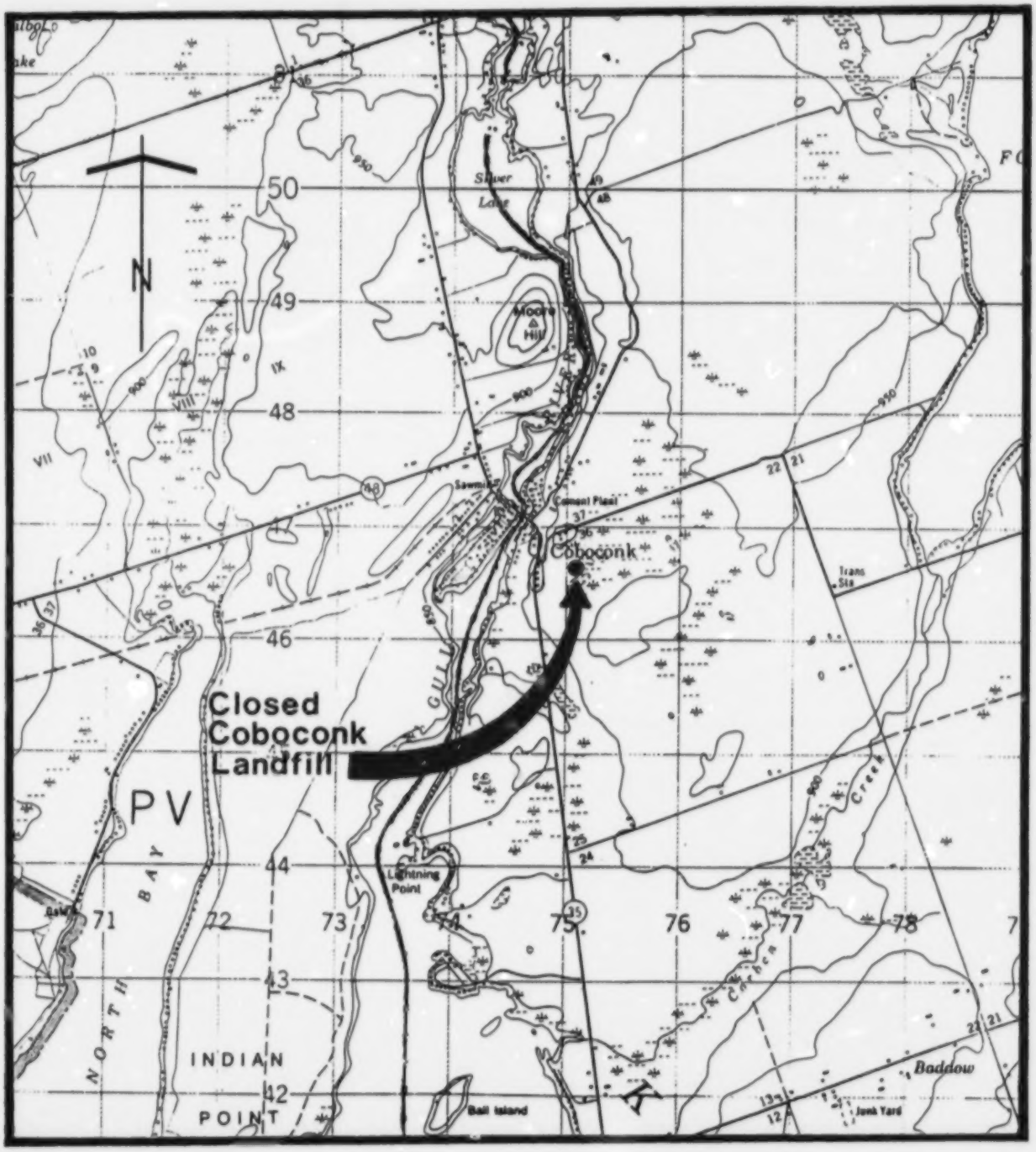

Figure 1
SITE LOCATION MAP

SCALE 1:50,000

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On some of the earlier documents the 5% industrial listed above is broken into 3% industrial and 2% hazardous wastes. However, a January 1987 letter from the Peterborough District MOE office revised this classification as shown above based on information received from the Township Reeve.

The landfill was operated as an open face dump for most of its life. Refuse was dumped off the north face of a 3 m high bedrock scarp into a lower area and filling probably proceeded in a northerly manner. Refuse was burned on a regular basis. Covering of refuse was reportedly carried out every two weeks, however lack cover material on-site probably made this task very difficult. Refuse is still visible along the north face.

3.0 PHYSICAL SETTING

The closed Coboconk Landfill is located in a rural, uplands area about 0.4 km southeast of the Village of Coboconk.

The area is described as a limestone plain by Chapman and Putnam, (1972). The main topographic relief in the area is the Gull River Valley which has cut about 20 m into the limestone plain. The Gull River is located about 0.5 km west of the landfill at its' closest point and flows in a southerly direction from Shadow Lake to Balsam Lake.

The Cedarhurst Limestone Quarry, which is located 0.3 km north of the landfill, also provides about 15 m of topographic relief. There is a drainage ditch in the bottom of the quarry which flows westward towards the river.

No flowing streams were observed during site visits on the landfill property. The area is poorly drained and bogs and swamps are present nearby.

Historical aerial photographs of the site from 1969, 1978 and 1987 were stereoscopically interpreted to provide a terrain analysis of the area. These aerial photographs are presented in Figures 2, 3 and 4.

Figure 2 illustrates that the landfill was well established in 1969. Quarries are apparent to the north and west of the site and bogs or swamps are present to the south and east. A bedrock scarp is also apparent just west of the landfill. No vegetation is established on the landfill.

Figure 3 shows the site in 1978, four years after it closed. Some vegetation is established on the landfill but most of the area appears largely unchanged from 1969. Both quarries are unchanged which suggests they were largely inactive during this period.

Figure 4 shows the site in 1987, thirteen years after closure. The landfill is covered with shrubs, trees and grasses. The access road into the site is partially overgrown. A new

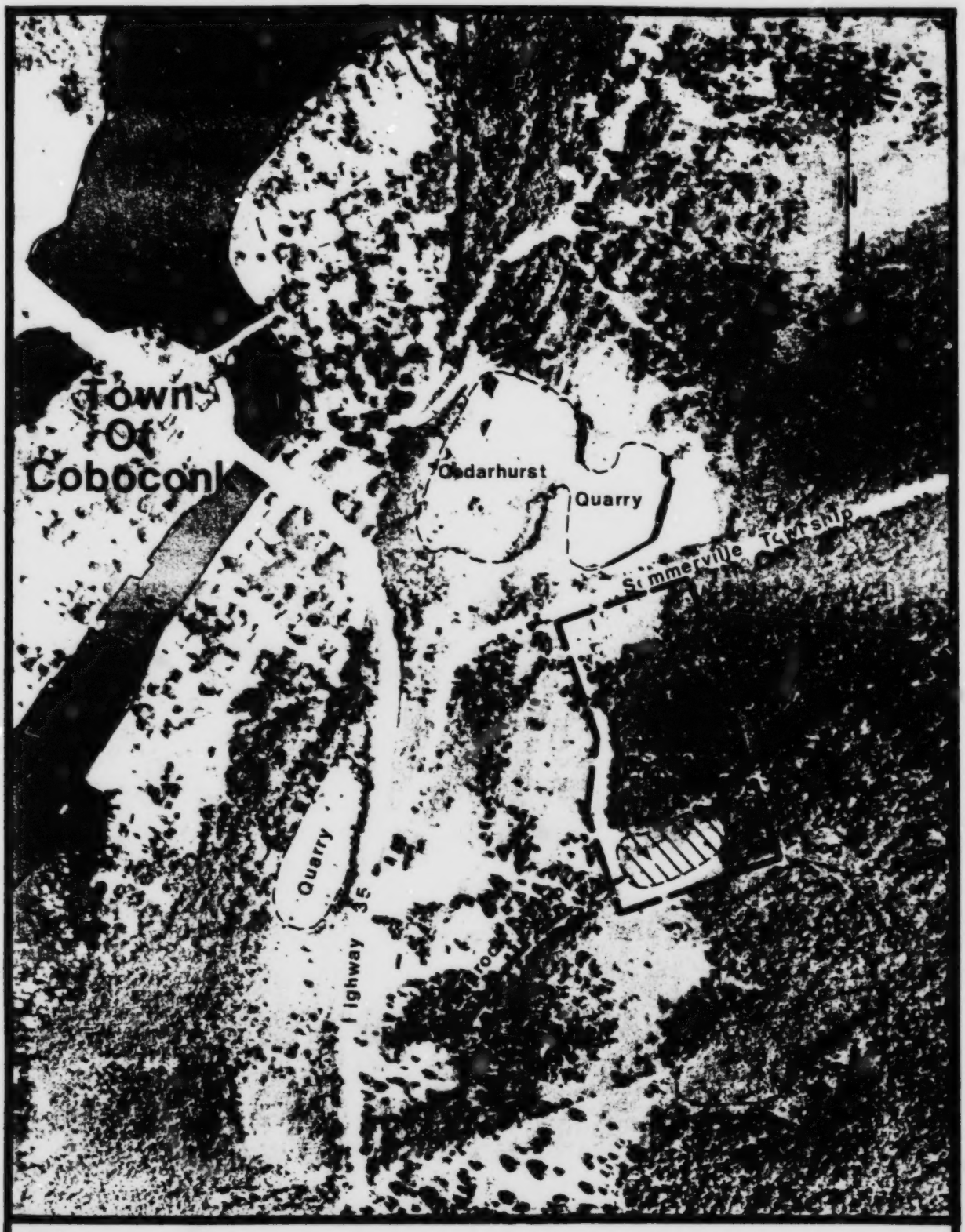

Figure 2

Closed Coboconk Waste Disposal Site

1969 Aerial Photograph

Scale 1:5,000 approx.

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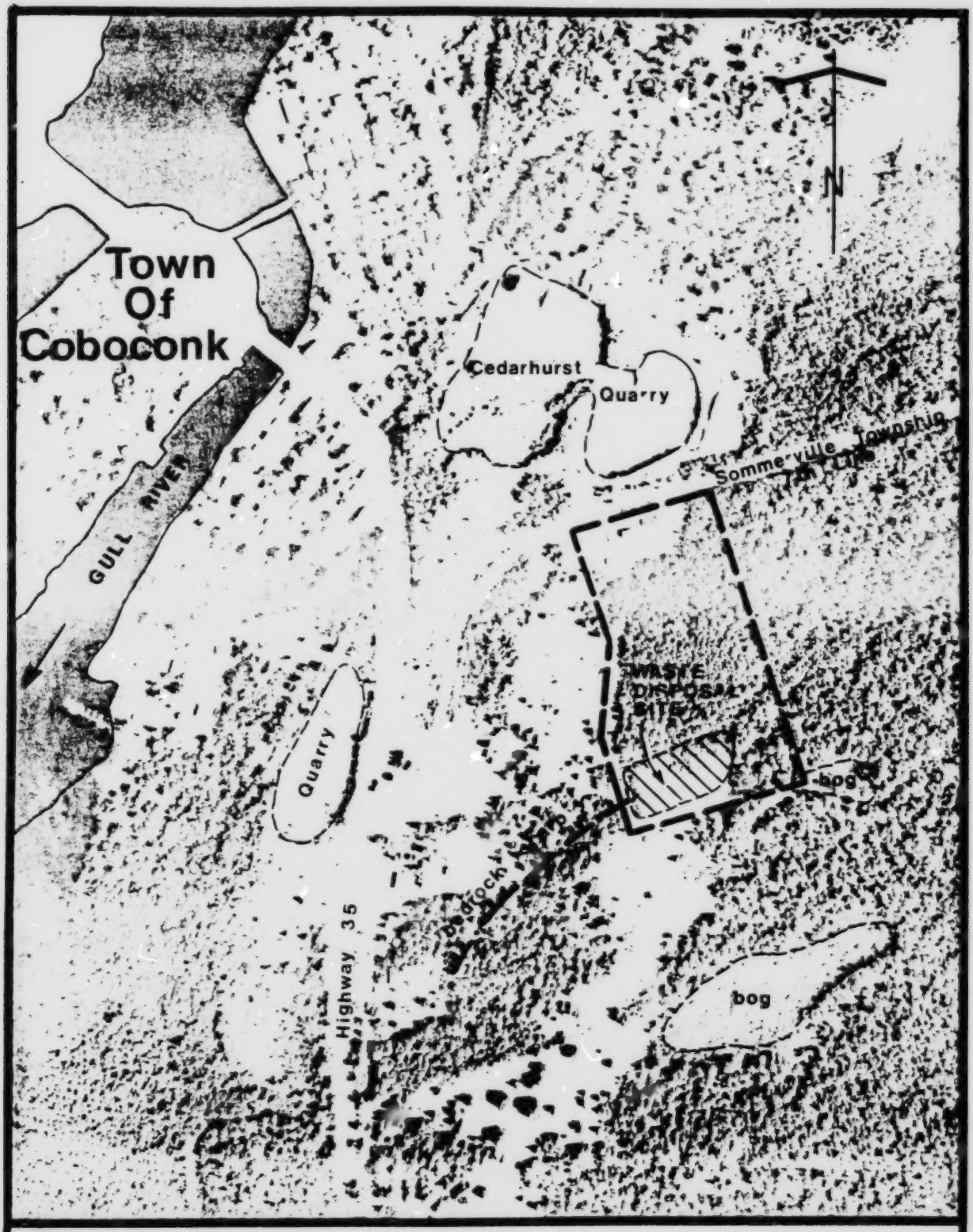

Figure 3

Closed Coboconk Waste Disposal Site

1978 Aerial Photograph

Scale 1:5,000 approx.

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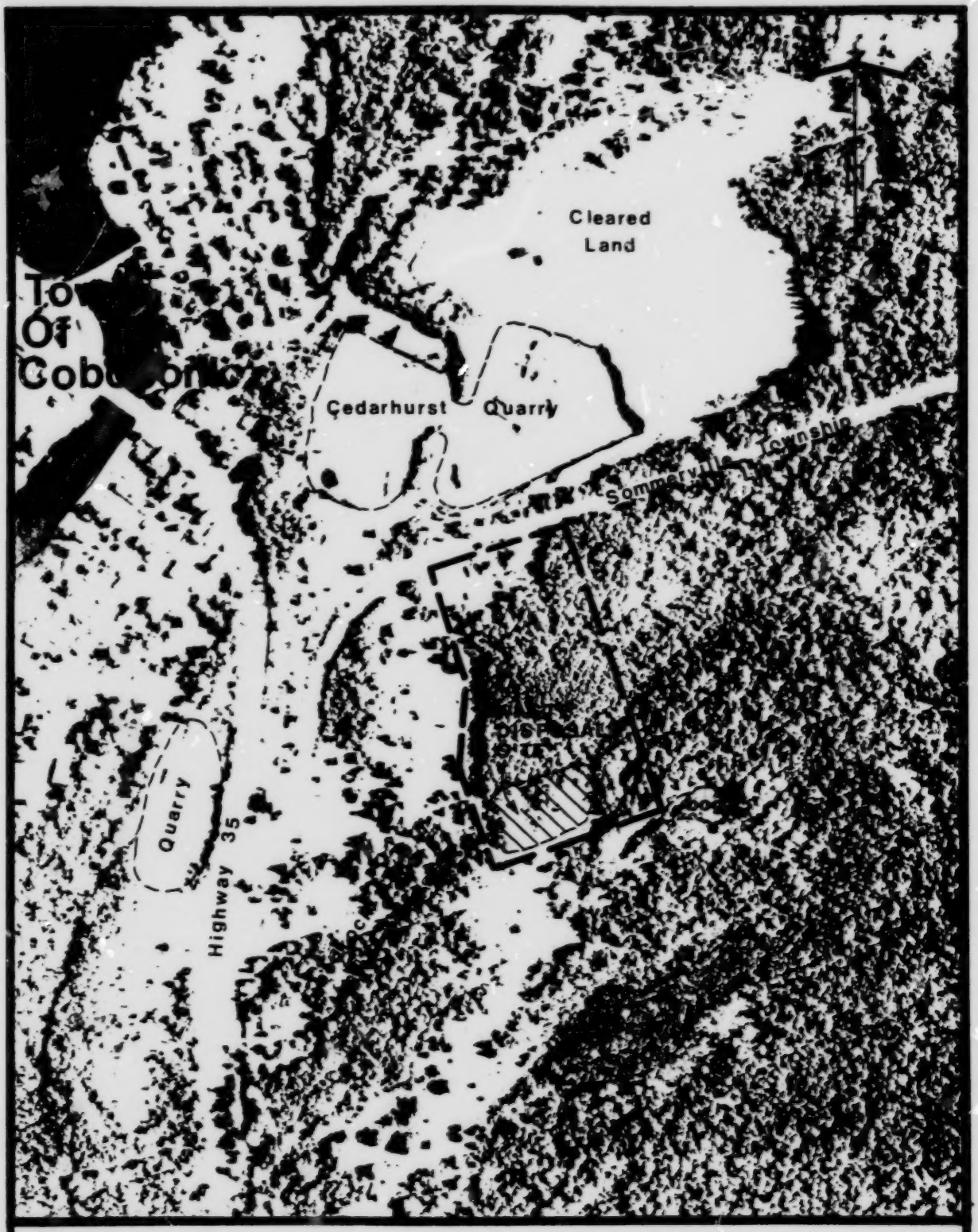

Figure 4

Closed Coboconk Waste Disposal Site

1987 Aerial Photograph

Scale 1:5,000 approx.

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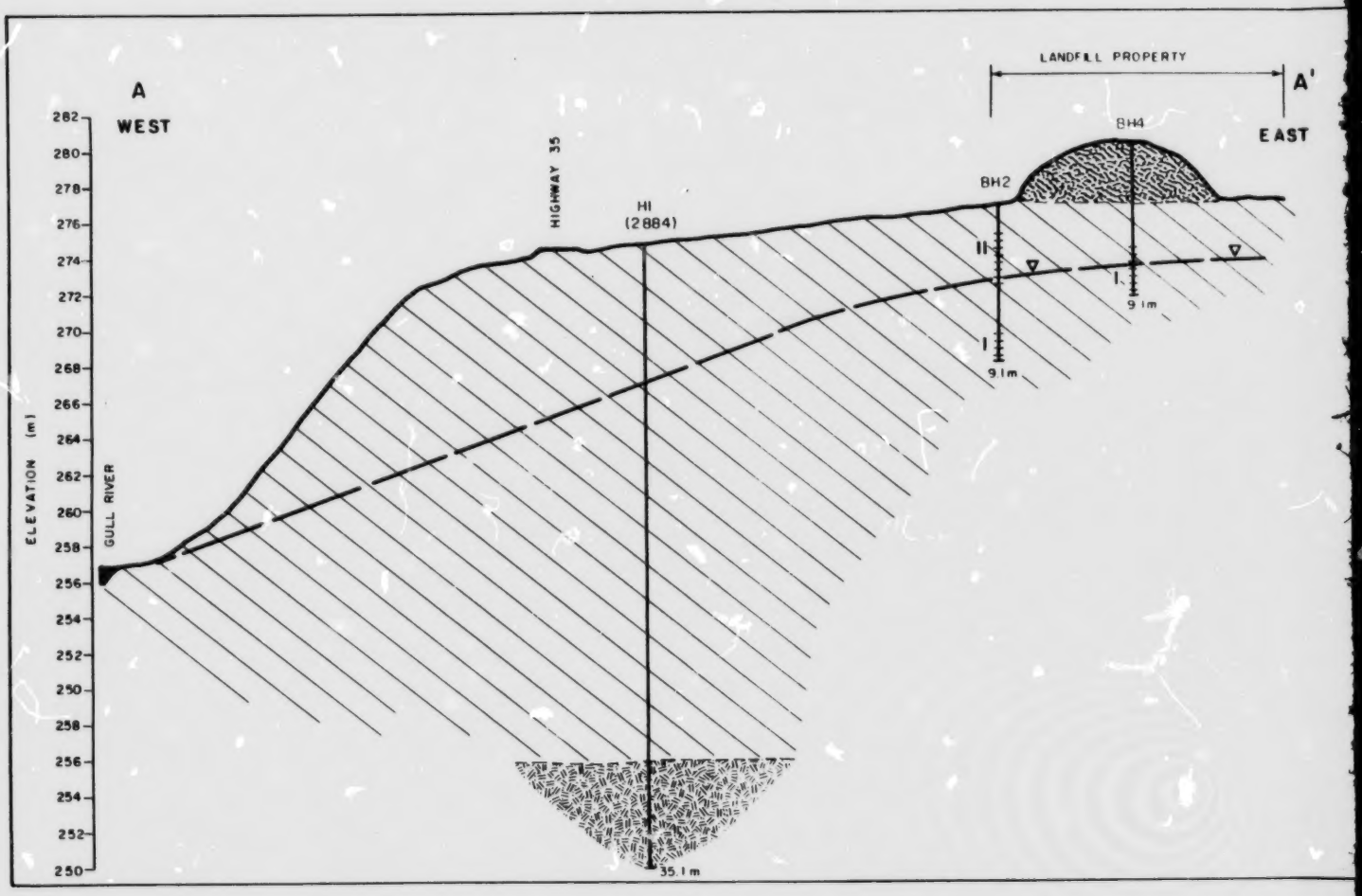
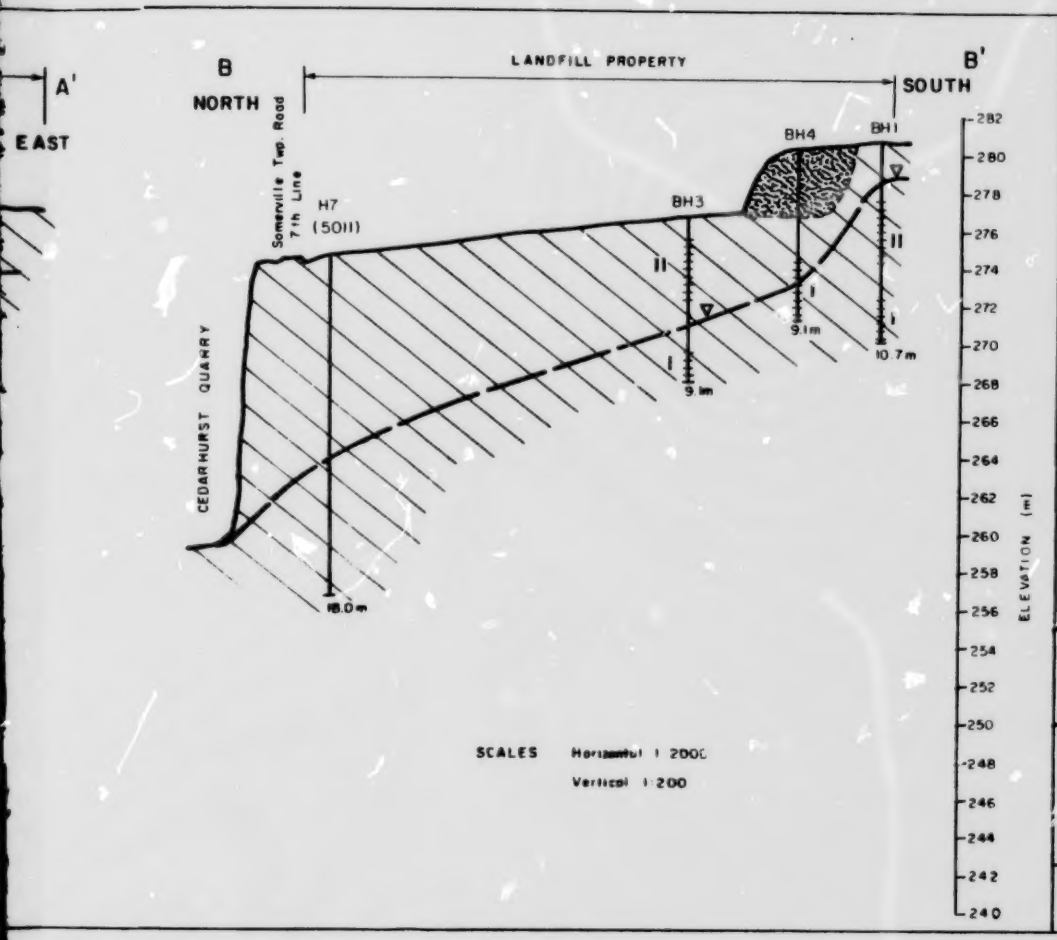
house has been built on 7th Line Road about 180 m northwest of the landfill. Cedarhurst Quarry to the north has expanded and a large area of land has been cleared presumably for additional quarrying in the future. The quarry to the west remains unchanged from conditions in 1969.

Figure 5 presents two cross-sections which illustrate how the landfill is related to the major topographic features in the area. Section A-A' runs east-west and Section B-B' runs north-south as shown on the site plan, Figure 6. Section A-A' shows how the land surface and the inferred water table slope eastward to the Gull River. Section B-B' illustrates how the grades in the Cedarhurst Limestone Quarry relate to the landfill and locally affect the water table elevation. The bedrock scarp at the south end of the landfill is also apparent on Section B-B'.


A
WEST
A'
EAST
LANDFILL PROPERTY
HIGHWAY 35
GULL RIVER
ELEVATION (m)
282
280
278
276
274
272
270
268
266
264
262
260
258
256
254
252
250
258
256
254
252
250
H1
(2884)
35.1 m
BH2
BH4
II
I
9.1m
9.1m



Legend

- REFUSE
- LIMESTONE BEDROCK
- CRYSTALLINE BEDROCK
- BH3 — BOREHOLE LOCATION & NUMBER
- H7 (5011) — RESIDENTIAL WELL & MOE NUMBER
- ESTIMATED GROUND SURFACE
- INFERRED WATER TABLE (AUG 1988)
- STRATIGRAPHIC CONTACT
- GROUND WATER MONITOR SCREEN
- 9.1m — DEPTH IN METRES

CROSS-SECTIONS A-A' and B-B'

Figure 5

CLOSED COBOCONK LANDFILL HYDROGEOLOGICAL ASSESSMENT for the Ministry of the Environment

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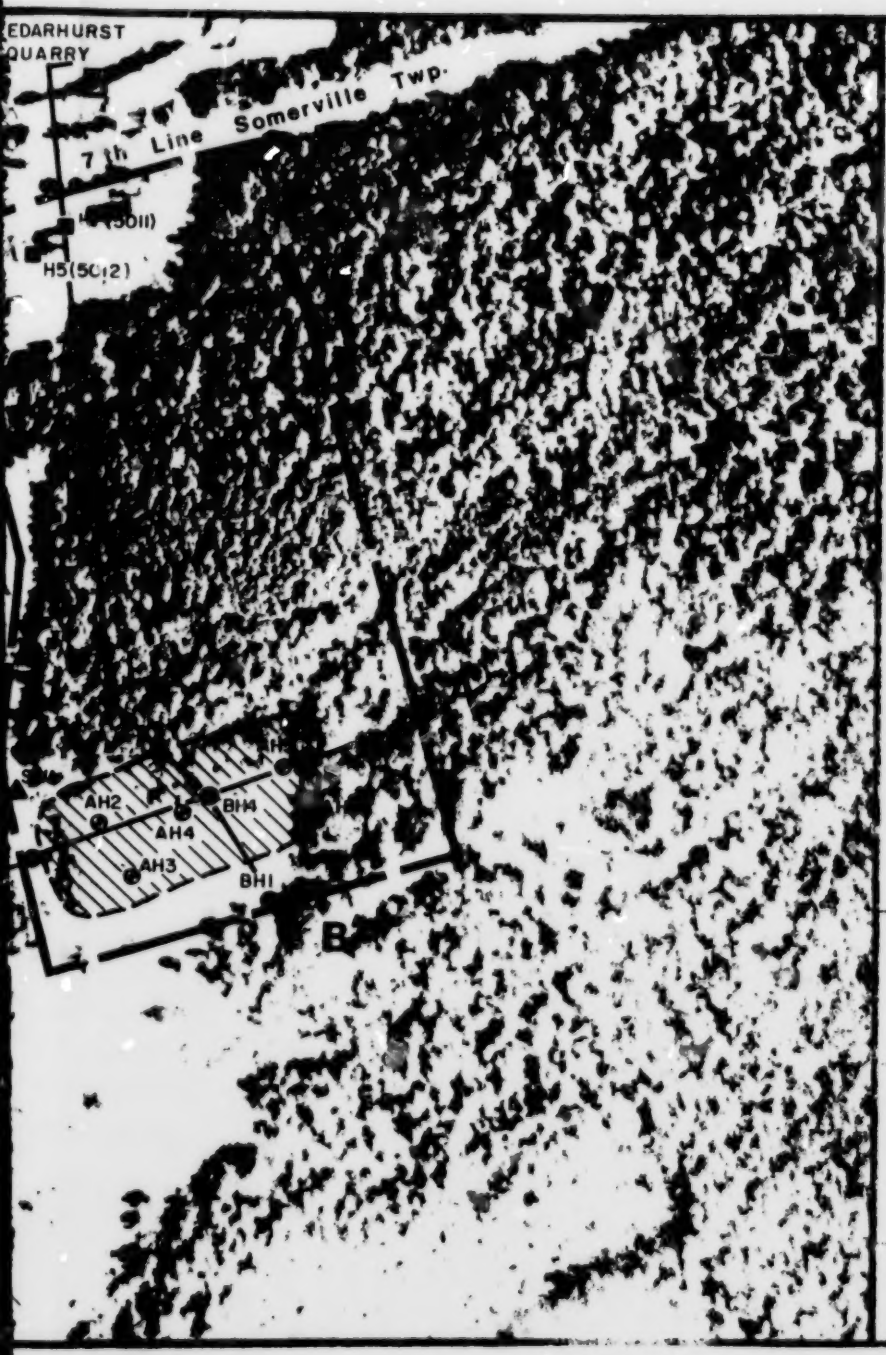
CEDARHURST
QUARRY
7th Line
H4
H5(5012)
R2/R3
Hwy. 35
AH2
AH4
AH3
PH2
Texaco Service
Station



Legend

- PROPERTY BOUNDARY
- ESTIMATED EXTENT OF REFUSE
- ● BH3 — GLL BOREHOLE AND GROUND WATER MONITOR LOCATION
- ■ H7(5011) — DOMESTIC WELL SAMPLING LOCATION WITH MOE WELL RECORD NO IN BRACKETS
- ▲ R1 — SURFACE WATER SAMPLING LOCATION
- AH5 — HAND AUGER BOREHOLE AND COMBUSTIBLE GAS TESTING LOCATION
- A — CROSS-SECTION LINE

AERIAL PHOTOGRAPHY - 1978

SCALE 1:2000 approx

SITE PLAN

Figure 6

CLOSED COBOCONK LANDFILL
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4.0 GEOLOGY

According to geological mapping (Liberty, 1969) the bedrock at this site consists of the Middle Ordovician Black River Group. Near surface the Bobcaygeon Formation lower member occurs. This is a grey fine grained argillaceous limestone. Below this occurs the lithographic limestones of the Gull River Formation. The contact between these two horizontally bedded limestone formations reportedly occurs at surface just west of the site.

Excellent vertical exposures of the bedrock are provided in the quarry north of the site and in the Highway 35 roadcut northwest of the site. Horizontal and vertical fractures are present in the rock as well as the horizontal bedding planes. Numerous flat lying limestone outcrops are visible at the landfill site, particularly on the south and west sides.

Quaternary geological mapping by Finamore and Bajc (1983) indicates that the area of the landfill is mapped as bedrock-drift complex. This is a discontinuous veneer of glacial drift which in places is sufficiently thick to subdue bedrock topography. This drift is very thin at the landfill site.

Seven boreholes were drilled at the site between August 15th and 19th, 1988, using a track mounted CME 55 drill rig. Boreholes were advanced using casing, NQ coring bit and/or tri-cone depending on the nature of the borehole. At three locations (BH1, BH2, BH3) two boreholes were drilled in order to permit installation of both deep (± 10m) ground water monitors (1-I, 2-I, 3-I) and shallow (± 5m) ground water monitors (1-II, 2-II, 3-II). The deep boreholes were cored and the shallow monitors were tri-coned. Water was trucked from the Gull River for drilling purposes. Only one borehole was drilled and one ground water monitor was installed at location BH4. The cored samples were geologically logged by GLL's supervising geologist. Geologic borehole logs are presented in Appendix III. Borehole locations are shown on Figure 6.

Limestone bedrock was encountered at surface in boreholes 1 and 2. Borehole 3 encountered 0.3 m of sandy silt topsoil above the limestone bedrock. Borehole 4

Limestone bedrock was encountered at surface in boreholes 1 and 2. Borehole 3 encountered 0.3 m of sandy silt topsoil above the limestone bedrock. Borehole 4 encountered 3.5 m of refuse and fill above the bedrock. All boreholes were terminated in limestone bedrock.

5.0 WATER BUDGET

Long term meteorological data for Coboconk meteorological station have been reviewed to prepare a water budget for this site.

The mean annual precipitation at Coboconk is 909 mm per year, based on 11 years of meteorological data from 1970 to 1980. There is some variation, from year to year, in the total annual precipitation (standard deviation of 108 mm about the mean value). The distribution of the precipitation varies from month to month, as shown on Figure 7, for a normal year.

A water balance has been prepared using the method described in Thornthwaite and Mather (1957), as shown on Table 1. The mean annual evapotranspiration is estimated to be 537 mm, based on an assumed soil moisture storage of 100 mm. The mean annual water surplus is calculated to be 372 mm.

The distribution of the surplus water on a monthly basis through a normal year is shown on Figure 8. It shows that a significant surplus of 440 mm occurs during the autumn, winter and spring months and a deficit of 68 mm occurs during the summer.

The water surplus comprises both the surface runoff and infiltration components of the water balance. Due to the relatively flat topography and presence of fractured limestone near surface at this site it seems likely that most of the water surplus infiltrates.

TABLE 1

WATER BALANCE CALCULATIONS FOR COBOCONK, ONTARIO UNDER AVERAGE CONDITIONS

MONTH	MEAN TEMP. °C	MEAN PRECIPI-TATION mm	ACTUAL EVAPO-TRANSPIRATION mm	ACTUAL WATER BALANCE mm
JAN	-9.2	73.7	0	74
FEB	-8.6	62.5	0	63
MAR	-2.9	68.9	0	69
APR	5.3	73.4	29	44
MAY	11.9	67.6	77	-9
JUN	17.0	86.4	107	-21
JUL	19.4	79.6	107	-27
AUG	18.4	85.6	97	-11
SEP	14.3	77.6	75	2
OCT	8.3	65.4	39	26
NOV	1.7	92.8	6	86
DEC	-6.3	75.9	0	76
YEAR		909	537	372

FIGURE 7

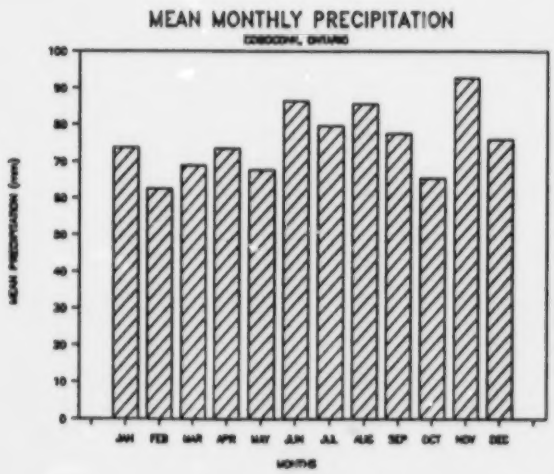
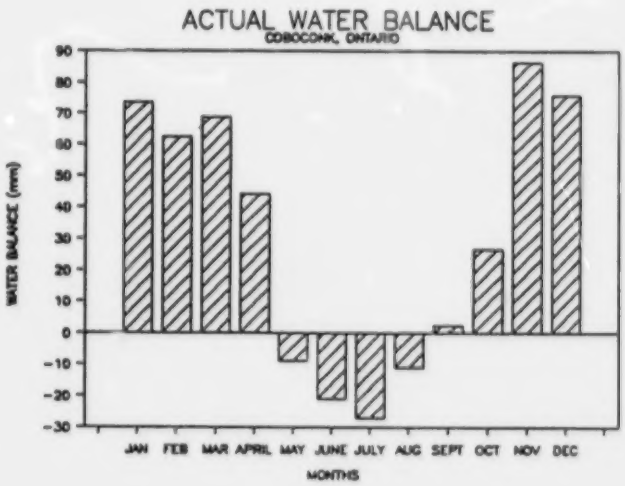


FIGURE 8



6.0 GROUND WATER USE

The following tasks were completed in order to assess ground water use in the vicinity of the closed Coboconk Landfill:

a) MOE Water Well Log Computer Printouts for the area were reviewed and plotted (see Appendix II).

b) Copies of the original MOE water well logs for Concession RFC lots 33, 34, 35 and 36 were obtained, reviewed and plotted (see Appendix II).

c) The Victoria County Official Plan Volume 1 Physical Base report was reviewed.

d) A water well survey involving resident interviews at eight homes near the landfill was carried out in August, 1988 (see Appendix II).

The water wells (H1 to H8) included in the survey are plotted on Figure 6. MOE well numbers are also provided where possible. There is some uncertainty regarding the locations of some of the wells recorded by the MOE due to the poor quality of the well location maps provided by the drillers.

The Victoria County Official Plan indicates that the Village of Coboconk uses individual wells for water supply. Sewage works consist of holding tanks and septic tank disposal systems. According to this report about 84% of the wells in this area are completed in bedrock and the rest in overburden. The limestone bedrock is geologically mapped as the Bobcaygeon and Gull River Formations and is by far the most important aquifer. Most wells obtain good yields and the limestone aquifer is an important water supply resource for future development in Coboconk and the surrounding area.

This assessment was confirmed during a detailed review of the thirteen original water well records for Concession RFC Lots 33, 34, 35 and 36. All the wells are completed in the limestone bedrock except for one shallow overburden well. Well depths range from

6 to 35 m with an average depth of 20 m. Reported static water levels range from 1 to 17 m with an average level of 7 m. Specific capacities vary between .01 and 0.5 L/s/m with an average of about 0.17 L/s/m, which confirms that yields are adequate for residential purposes.

Three of the residents which were interviewed reported problems with their wells. Well H7 was partially depleted of water about four years ago apparently due to ground water interference effects from expansion of the Cedarhurst Quarry. A new well will reportedly be drilled soon. Well H8 apparently has been flooded in the past by spring runoff. Well H6 was apparently contaminated with petroleum from a leaking tank at the Texaco Station on Highway 35. Water was brought in for the resident's use for three years, during which time the well was pumped out and apparently rehabilitated.

7.0 GROUND WATER FLOW

Ground water levels were measured in the on-site monitors on five occasions in August and on one occasion in November 1988. These results and geodetic water level elevations calculated from survey information are presented in Appendix III.

The water table measured in the monitors at the site generally occurred between 2 and 7 m below grade in August, depending upon location. The summer of 1988 was exceptionally hot and dry which probably accounts for the deep water levels at monitor locations 2, 3 and 4 in August. The water table in November, after a period of heavy rain, was between 0 and 3.5 m below grade, depending upon location.

Water level rises in the order of 0.8 to 5.5 m occurred in the various monitors between August and November. The smallest changes occurred at borehole 1. Highly permeable fractures are present in the upper 2 m of borehole 1 as evidenced by excessive water losses during coring of the bedrock at this location. These permeable fractures probably control water levels at borehole 1 within a narrow range by rapidly draining off any excess infiltration.

Water levels in all the other monitors at borehole locations 2, 3 and 4 rose by 3.5 m or more between August and November 1988. The magnitude of these water level rises is due to the relatively low fracture porosity of the limestone bedrock. For instance, if the effective fracture porosity was 1% then a 10 mm infiltration event transferred to the water table could cause a 1 m rise in ground water levels.

Figures 9 and 10 present water table elevation maps for August 25 and November 11, 1988 based on water level elevations in on-site ground water monitors. A surveyed water level elevation in the Cedarhurst Quarry drainage ditch and an estimated water level for the Gull River (estimated from 1:50,000 topographic map) are also provided on Figures 9 and 10 to illustrate how ground water elevations at the landfill site relate to the regional ground water flow system.

Legend

PROPERTY BOUNDARY

ESTIMATED EXTENT OF REFUSE

●276.61 WATER TABLE ELEVATION (mASL) MEASURED AUG. 25, 1988

INFERRED GROUND WATER FLOW DIRECTION

AERIAL PHOTOGRAPHY - 1978

SCALE 1:2000

WATER TABLE ELEVATIONS (Aug. 25, 1988)	Figure 9

CLOSED COBOCONK LANDFILL
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Legend

PROPERTY BOUNDARY

ESTIMATED EXTENT OF REFUSE

276.61 WATER TABLE ELEVATION (mASL) MEASURED NOV. 11, 1988

INFERRED GROUND WATER FLOW DIRECTION

AERIAL PHOTOGRAPHY - 1978

SCALE 1:2000

WATER TABLE ELEVATIONS (Nov. 11, 1988)

Figure 10

CLOSED COBOCONK LANDFILL
HYDROGEOLOGICAL ASSESSMENT
for the
Ministry of the Environment

Ground water flow was to the north-northwest on both dates, in spite of the large seasonal changes in water levels. Flow to the north-northwest suggests that ground water flow below the landfill is influenced by the dewatering effect of the Cedarhurst Quarry as well as by the Gull River which is probably a regional ground water discharge zone.

Lateral hydraulic gradients generally range between 0.03 and 0.08 with the higher lateral gradients occurring in August. Lateral hydraulic gradients in November were less than half of what they were in August. In addition the lateral gradients appear to be slightly steeper at the south end of the site near the bedrock scarp and tend to flatten out on the flat limestone plain north of the landfill.

Vertical hydraulic gradients at this site are generally downward indicating recharge conditions, as would be expected in this uplands area. In August the vertical hydraulic gradients were between 0.02 and 0.18 downward. In November they were reduced to an average of about 0.01 downward.

All the on-site ground water monitors were slug tested to assess the in-situ hydraulic conductivity of the fractured limestone bedrock. The test results were plotted and analyzed using the methods of Hvorslev (1952). The test plots and calculations are presented in Appendix III. The hydraulic conductivity results are summarized below in Table 2.

The measured hydraulic conductivity of the limestone bedrock ranged from 9×10^{-9} to 1×10^{-5} m/s with a geometric mean value of 3×10^{-7} m/s and a median value of 2×10^{-7} m/s. Hydraulic conductivity values vary over three orders of magnitude due to the presence or absence of fracture as well as variations in fracture aperture and continuity. The primary hydraulic conductivity of the unfractured limestone matrix at this site is probably less than 1×10^{-8} m/s.

It is difficult to estimate average ground water flow velocities in fractured bedrock due to the large variability in hydraulic conductivities from place to place. However, based

Table 2 Summary for Hydraulic Conductivity of the Limestone Bedrock Based on Slug Test Results

Monitor	Depth of Screen (m)	Hydraulic Conductivity (m/s)
1-I	8.3 - 9.8	1×10^{-5}
1-II	3.1 - 6.1	1×10^{-7}
2-I	7.5 - 9.0	8×10^{-6}
2-II	1.6 - 4.6	9×10^{-9}
3-I	7.2 - 8.7	1×10^{-8}
3-II	1.3 - 4.3	2×10^{-7}
4-I	5.8 - 8.8	6×10^{-7}

on an average hydraulic gradient of 0.055, the geometric mean hydraulic conductivity of 3×10^{-7} m/s and estimated fracture porosity for the limestone of 1%, an average ground water flow rate of about 50 m/yr can be calculated using Darcy's Law. Based on this flow rate, average ground water travel times from the landfill to Gull River (0.5 km) or to the Cedarhurst Quarry (0.4 km) would be in the order of ten years. Since the landfill closed over fourteen years ago there is no reason to expect that leachate impacts will become more severe in the future.

8.0 WATER QUALITY IN GROUND WATER MONITORS

The on-site ground water monitors were developed by removing three well-bore volumes of water prior to sampling. Well development and sampling were carried out using Terraqua hand pumps and polyethylene tubing dedicated to each monitoring well. The samples were collected in August 1988. There was insufficient water in shallow monitors 2-II and 3-II in August so these monitors were developed and sampled in November 1988 after the water table had risen in response to infiltration from a period of wet weather. Monitor 4-I was sampled in August and again in November to provide a preliminary assessment of ground water quality seasonal variations.

The chemical analysis results are presented in Appendix IV and are summarized on Table 3.

Monitors 1-I and 1-II are located upgradient of the landfill and thus are representative of background ground water quality. Monitors 2-I, 2-II, 3-I and 3-II are located downgradient of the landfill where some leachate impacts on ground water quality would be expected. Monitor 4-I was installed directly below the refuse and should have water quality which is representative of the leachate source.

Review of Table 3 indicates the chemical concentrations in the leachate monitor, 4-I, and in the downgradient monitors, 2-I, 2-II, 3-I and 3-II, are generally not much higher than the background concentrations in monitors 1-I and 1-II. Water quality in all the monitors is relatively good compared to typical landfill sites. The leachate is exceptionally dilute. For instance the maximum chloride concentration measured on-site is 11 mg/L. The drinking water objective is 250 mg/L and it is not uncommon to get chloride concentrations of 1000 mg/L or more in leachate from typical Ontario landfills.

The leachate sample from monitor 4-I was also tested for a scan of volatile organic compounds (U.S. EPA Method 624), phenols and heavy metals. No volatile organic compounds were detected at concentrations above the method detection limits.

PROJECT NO: 88-237 CLOSED COBOCONK LANDFILL

TABLE 3: Summary of Water Quality in Ground Water Monitors
Results in mg/L unless otherwise noted.

MONITOR	1-I	1-I(BH6)	1-II	2-I	2-II	3-I	3-II	4-I	4-I	Municipal Tap (BH5)
DATE	Aug-88	Aug-88	Aug-88	Aug-88	Nov-88	Aug-88	Nov-88	Aug-88	Nov-88	Aug-88
PARAMETERS										
Total Dissolved Solids	314	215	290	297	396	315	769	323	576	158
Conductivity (μmho/cm)	625	430	575	560	522	660	1098	640	766	300
Calcium	113	75	99	64	64	86	137	88	117	36
Magnesium	3.8	3.6	7.8	14	5.7	12	14	21	10	8.3
Sodium	0.9	0.6	0.9	20	25	7.6	25	4	3.3	8.8
Potassium	0.6	0.4	3.5	3.7	2.1	6.3	23	3.4	11	1.2
Chloride	2	2	3	11	3	11	10	4	1	25
Alkalinity (CaCO3)	290	195	250	175	199	190	294	280	321	85
Sulphate	15	11	21	70	49	70	176	26	33	26
Iron (dissolved)	0.07	0.04	0.02	0.03	0.03	0.06	0.03	0.05	0.02	0.02
Manganese (dissolved)	0.06	0.06	0.04	0.04	0.03	0.03	0.04	0.04	0.06	0.01
Ammonia (N)	<.05	<.05	<.05	0.4	<.05	0.25	<.05	0.23	0.09	0.19
Nitrate+Nitrite (N)	<.05	<.05	<.05	0.86	0.22	0.56	4.6	0.11	0.74	0.24
Total Organic Carbon	4.1	3.5	2.9	4.1	2.0	5.4	5.6	2.6	2.0	2.6
Phenols	<.002	<.002	<.002	0.006	<.002	0.003	<.002	0.003	<.002	0.003

1-I(BH6) - 'Blind' Replicate Sample
Toronto Tap (BH5) - 'Blind' QA Sample

Similarly the leachate heavy metal concentrations were generally below detection limits or were typical of background levels in ground water. Phenol concentrations slightly exceeded the drinking water limit in the August leachate sample and several downgradient monitors, however, phenols were not detected in the November samples from monitors 2-II, 3-II and 4-I.

The dilute nature of the leachate and the lack of significant ground water quality degradation can probably be attributed to the following:

(a) the landfill is very small,
(b) landfill closed over fourteen years ago,
(c) the most of the refuse was burned, and
(d) the landfill does not have an impermeable cover and infiltrating precipitation has probably flushed out most of the soluble contaminants years ago.

Ground water quality data from monitoring wells and residential wells were compared to the Ontario Drinking Water Objectives. The results of this comparison are presented in Table 4. None of the health-related objectives were exceeded in any of the monitoring wells. Only four of the aesthetic consideration objectives were exceeded and only in a few of the monitoring wells.

Replicate samples were collected in August from monitor 1-I, residential well H6 and surface water station R2. The replicate samples were submitted to the laboratory with false names (BH6, H9 and R3) for quality assurance purposes. The results of the residential well (H6/H9) and surface water (R2/R3) replicates correlate reasonably and are generally within the accepted range for laboratory accuracy. The replicate samples from ground water monitor 1-I do not correlate as well but this is more likely related to sampling than to laboratory analysis. The residential well and surface water replicate samples were collected at the same time. However, it was necessary to allow water levels in monitor 1-I to recover for several hours prior to collecting the second sample.

TABLE 4: Drinking Water Objectives Exceedances

Parameter	MOE Drinking Water Objectives	Residential Wells in Exceedance (concentrations in mg/L)	Monitoring Wells in Exceedance (concentrations in mg/L)
Chloride	250	H6 (360)	
Total Dissolved Solids	500	H1 (877), H3 (606), H4 (590), H6 (999)	3-II (769), 4-I (576 Nov)
Total Organic Carbon	5.0	H7 (5.9)	3-I (5.4), 3-II (5.6)
Iron*	0.3	H1 (.31), H5 (.36), H6 (.64), H7 (1.0)	
Manganese*	0.05	H3 (.16), H6 (.46), H7 (.11)	1-I (.06), 4-I (.06 Nov)
Phenols	0.002	H3 (.006), H5 (.003), H6 (.003) H7 (.003), Toronto Tap (BH5) (.003)	2-I (.006), 3-I (.003), 4-I (.003 Aug)

* total metal concentrations were considered for residential wells and dissolved metal concentrations were considered in monitoring wells due to the presence of suspended silt and clay particles.

9.0 WATER QUALITY IN RESIDENTIAL WELLS

Water samples were collected from eight residential wells in the vicinity of the landfill in August 1988. Residential well sampling locations are shown on Figure 6. The taps were allowed to run for several minutes prior to sampling, while the residents were being interviewed about their wells (see Appendix II).

The chemical analysis results are presented in Appendix IV and are summarized in Table 5. Table 4 (see section 8.0) presents the results of a comparison of the data with Ontario Drinking Water Objectives. No health-related objectives were exceeded.

Four of the residential wells (H1, H3, H4 and H6) which are located along Highway 35, have above background levels of conductivity (>1,000 umho-cm) sodium (>50 mg/L) and chloride (>50 mg/L), and exceed the objective for total dissolved solids (T.D.S.). This is probably due to application of de-icing salt to the highway, parking lots and driveways. Well H6 also exceeded the objective for chloride of 250 mg/L.

Four wells exceeded the limits for total iron and three exceeded the total manganese limit. These aesthetic limits are established primarily to prevent staining of plumbing fixtures and the levels of iron and manganese found could be caused by natural background water quality. One well (H7), also slightly the aesthetic objective for total organic carbon, and four wells (H3, H5, H6 and H7) exceeded the aesthetic objective for phenols as did the quality assurance blank sample of municipal tap water.

Three wells H3, H4 and H8 have above-background nitrate concentrations (2.2 to 5.2 mg/L) although the drinking water objective of 10 mg/L was not exceeded. This suggest minor ground water quality degradation from septic systems, which is common where fractured bedrock occurs near surface as it does in this area.

Three of the residents interviewed reported water quality problems with their wells. Well H6 was reportedly contaminated with petroleum product from a spill at the nearby Texaco station several years ago. Apparently the resident had to import water for three years. During this time the well was pumped out and rehabilitated, and since then the

PROJECT NO: 88-237 CLOSED COBOCONK LANDFILL

TABLE 5: Summary of Water Quality in Residential Wells
Results in mg/L unless otherwise noted.

Residential Well	H1	H2	H3	H4	H5	H6	H6(H9)	H7	H8	Municipal Tap (BH#5)
Date	Aug-88	Aug-88	Aug-88	Aug-88	Aug-88	Aug-88	Aug-88	Aug-88	Aug-88	Aug-88
Parameters										
Total Dissolved Solids	877	300	606	590	380	999	985	422	387	158
Conductivity (μmho/cm)	1480	593	1240	1128	760	1960	1990	770	760	300
Calcium	138	88	129	134	94	200	197	112	111	36
Magnesium	24	11	13	8.3	20	9.8	9.7	13	6.6	8.3
Sodium	120	7.3	84	58	14	170	160	22	16	8.8
Potassium	5.0	1.9	3.4	1.9	4.1	3.7	3.7	3.0	2.4	1.2
Chloride	54	8	140	95	22	360	350	41	20	25
Alkalinity (CaCO3)	210	240	280	230	250	350	360	250	230	85
Sulphate	400	33	49	140	67	35	34	75	65	26
Iron (total)	0.31	0.05	0.19	0.03	0.36	0.64	0.64	1.0	0.03	0.03
Manganese (total)	0.05	0.01	0.16	0.01	0.05	0.46	0.45	0.11	0.01	<.01
Ammonia (N)	0.35	<.05	<.05	<.05	0.19	0.93	0.95	0.14	<.05	0.19
Nitrate+Nitrite (N)	<.05	0.13	2.9	2.2	0.17	0.69	0.73	<.05	5.2	0.24
Total Organic Carbon	1.7	2.6	3.9	2.8	4.1	4.5	4.5	5.9	3.3	2.6
Phenols	<.002	<.002	0.006	<.002	0.003	0.003	<.002	0.003	<.002	0.003

H6 (H9) - 'Blind' Replicate Sample
Toronto Tap (BH#5) - 'Blind" QA Sample

resident has resumed use of the well. The owner of well H8 reported that flooding of the well during spring run-off was a problem in the past. The owner of well H7 reported sulphur problems and water level depletion which she attributed to the dewatering effect of the nearby Cedarhurst Quarry.

Based on the available data it seems unlikely that leachate from the closed Coboconk Landfill will ever have a detectable impact on the residential wells in the area. While it is hydraulically possible for leachate to reach some of the residential wells the leachate would likely have negligible impact because:

(a) The leachate chemistry at this landfill is so dilute that concentrations of most parameters are not as high in leachate as they are in water from local residential wells.

(b) Dilution and attenuation of leachate would occur along the 200 m long flow path to the nearest residential wells.

(c) The effects of dilute leachate impact would be masked by potential impacts of local contaminant sources such as septic systems and road salt contamination which are located nearer the residential wells

10.0 SURFACE WATER FLOW

No streams or flowing surface water were observed on the landfill property during site visits in August and November 1988, although some ponded surface water was present in November.

The ditch which drains the Cedarhurst Quarry, north of the landfill property, was flowing in August, 1988 after an exceptionally dry summer. This observation confirms that this drainage ditch is fed by ground water discharge.

The Gull River is the area's major drainage channel and is located about 500 m from the landfill. Stream flow data for the Gull River is available from the gauging station (No. 02HF002) at Norland, 8 km north of Coboconk. Mean annual discharge at this station was 30.4 m^3/s for the period 1963 to 1986. The highest daily discharge for the period of record was 80.4 m^3/s which occurred on April 2, 1976. The lowest daily discharge was 1.37 m^3/s which occurred on December 22, 1964.

11.0 SURFACE WATER QUALITY

Samples of surface water from the Gull River (R2, R3, R4) and the Cedarhurst Quarry drainage ditch (Q1) were collected in August, 1988. A sample of ponded surface water (SWA) was collected near the west side of the landfill in November, 1988. Chemical analysis results of these samples are provided in Appendix IV and are summarized in Table 6.

Water quality in the Gull River is good. Due to the large flow volumes in this river, it would be impossible to ever detect any leachate impacts attributable to the closed Coboconk Landfill.

The water used for coring the boreholes at the landfill was obtained from the Gull River at location R2.

The water quality in the quarry ditch is much more mineralized than the Gull River water due to ground water discharge from the limestone bedrock. Concentrations of conductivity, calcium, magnesium, sodium, alkalinity and sulphate are up to an order of magnitude higher than in the Gull River.

Water quality in ponded surface water near the west flank of the landfill also contained elevated levels of conductivity, calcium, and alkalinity which are not typical of runoff from recent precipitation. However, the chloride concentration for SWA was <1 mg/L which is not typical of leachate contamination. SWA is located near monitors 2-I and 2-II. The water table was observed to be at surface in these monitors in November 1988 which suggests that the mineralized water quality in the SWA sample may be related to localized ground water discharges from the fractured limestone outcrops in this area at the base of the bedrock scarp.

PROJECT NO: 88-237 CLOSED COBOCONK LANDFILL

TABLE 6: Summary of Surface Water Quality
Results in mg/L unless otherwise noted.

Station	Q1	R2	R2(R3)	R4	SWA	Municipal Tap (BH#5)
Date	Aug-88	Aug-88	Aug-88	Aug-88	Nov-88	Aug-88
Parameters						
Total Dissolved Solids	384	40	40	35	500	158
Conductivity (µmho/cm)	740	73	76	65	570	300
Calcium	82	9	9	8	104	36
Magnesium	18	1.8	1.7	1.7	3.0	8.3
Sodium	15	1.5	1.8	1.3	10	8.8
Potassium	3.7	0.7	0.6	0.5	4.0	1.2
Chloride	19	3	3	3	<1	25
Alkalinity (CaCO3)	140	19	21	16	294	85
Sulphate	150	11	10	10	18	26
Iron (total)	0.07	0.07	0.30	0.04	0.03	0.03
Manganese (total)	0.01	0.02	0.05	0.01	0.04	0.01
Ammonia (N)	0.1	0.05	<.05	<.05	<.05	0.19
Nitrate+Nitrite (N)	2.5	<.05	<.05	<.05	<.05	0.24
Total Organic Carbon	4.7	4.6	4.2	4.1	3.7	2.6
Phenols	<.002	<.002	<.002	<.002	-	0.003

R2 (R3) - 'Blind' Replicate Sample
Toronto Tap (BH #5) - 'Blind' QA Sample

12.0 LANDFILL GAS

Methane and carbon dioxide are the principal gases generated at a landfill site. Carbon dioxide is heavier than air and is not explosive. Methane is a combustible gas which is explosive in concentrations of 5 to 15% mixed with air. Methane is lighter than air and tends to migrate upward.

Lateral off-site gas migration problems generally occur when frozen ground surfaces or low permeability landfill covers prevent upward venting of gas to the atmosphere. When this occurs, gas pressure builds up in the landfill and the gas begins to migrate laterally towards areas of low pressure, such as underground spaces like basements. Winter operation of furnaces in basements of nearby buildings can actually cause a negative pressure sink that induces gas flow towards it. A layer of unsaturated, permeable soil or rock that is horizontally continuous is generally required for significant gas movement to occur. Methane cannot move through saturated soils or rock (e.g., below the water table) and only moves very slowly through low permeability materials.

Six hand auger boreholes were drilled into the top of the landfill to permit gas sampling and testing in August, 1988. Hand auger borehole locations are shown on Figure 6 and geologic logs are presented in Appendix III.

Methane gas concentrations were measured in each hand auger borehole using a portable gas sniffer which detects combustible gases as a percentage of total atmosphere. No combustible gas concentrations were detected in any of the hand auger boreholes. Similarly, there was no evidence of vegetation damage caused by methane gas concentrations.

The lack of methane gas is consistent with what we know about this landfill. The refuse was burned regularly which would have consumed and oxidized most of the organic matter in the refuse which is the major source of methane production in most municipal landfills. In addition, the landfill surface final cover consists of a thin layer of silty sands with exposed refuse along the northern slope, thus any methane produced would easily

vent to the atmosphere. The site has been closed for over fourteen years so gas generation rates would probably be significantly less than when the site was in operation.

The limestone bedrock occurs from 0 to 0.5 m below grade at this site. Consequently all the refuse was emplaced above grade and there is little likelihood for lateral, subsurface gas migration. In addition, the effective porosity and permeability of the limestone is relatively low, which further restricts subsurface gas movement.

In summary, methane gas impacts from the Closed Coboconk Landfill on adjacent properties and residences is highly unlikely.

13.0 CONCLUSIONS

The following conclusions are drawn based on the results of this hydrogeological assessment and review of previous investigations:

1. The limestone bedrock aquifer which outcrops in the vicinity of the landfill is the main water supply for the residents of this area. Ground water flow beneath the landfill is to the north-northwest towards several residences which are located about 200 m from the landfill. However, the results of this study indicate that the landfill has almost negligible impact on ground water quality in the bedrock aquifer because the leachate is exceptionally dilute. This is probably due to the following factors:

   (a) the landfill is very small (0.5 hectares),
   (b) the landfill was closed over fourteen years ago and time has reduced the strength of the leachate,
   (c the refuse was burned regularly which reduced the organic content of the leachate, and
   (d) the leachate is diluted by clean ground water flowing below the site in the limestone bedrock.

   There are no detectable water quality impacts on local residential wells attributable to the landfill because of the dilute nature of the leachate and additional dilution and attenuation along the 200 m ground water flow path. Based on our understanding of the landfill history and ground water flow system, any leachate impacts on the bedrock aquifer would have been at a maximum in the 1970s. There is no reason to expect that leachate impacts will become worse in the future.

2. The nearest flowing surface water courses to the landfill are the Gull River, 500 m to the west, and a drainage ditch in the bottom of the Cedarhurst Quarry,

400 m to the north. No leachate impacts were detected on water quality in either of these two streams and none are expected in the future.

3. No methane gas was detected in six hand auger holes drilled into the landfill. There is very little potential for significant off-site methane gas migration in this hydrogeological setting and gas impacts on adjacent residences either now or in the future are highly unlikely.

14.0 RECOMMENDATIONS

Based on the conclusions of this hydrogeological assessment the following recommendations are submitted for consideration:

1. No remedial measures are required at this site to contain or control leachate or methane gas. Improvements to the landfill final cover including covering the exposed refuse along the north face was previously recommended by the MOE in the early 1970s. This would have been a good idea in the 1970s, however, completion of this work in 1989 would undoubtedly involve the destruction of mature trees and vegetation which now cover the site. Since the site is far removed from public view and most of the contaminants in the landfill have already been leached out, it is our opinion that remedial actions to improve the landfill cover would have little beneficial effect at this time.

2. On-site monitoring of ground water and surface water quality, and methane gas is not warranted because the existing impacts are negligible at present and are expected to decrease in the future. Monitoring of residential wells as a landfill-related program is also unwarranted because water quality in the residential wells is far more likely to be affected by nearby septic systems, road salting and other closer contaminants sources than by the landfill. This surficial bedrock aquifer is susceptible to contamination and perhaps the residents should be informed of existing MOE and local Health Department services regarding domestic water well quality.

3. The construction of new residences and water supply wells closer to the landfill than the existing residential wells is probably not advisable without a more detailed investigation of leachate pathways in the limestone aquifer.

15.0 SELECTED REFERENCES

Chapman, L.J., and Putnam, D.F. 1972:

The Physiography of Southern Ontario; University of Toronto Press, Toronto, Ontario, 386 p.

Finamore, P.F., and Bajc, A.F. 1983:

Quaternary Geology of the Fenelon Falls Area, Southern Ontario; Ontario Geological Survey, Preliminary Map P.2596.

Hvorslev, M.J. 1951:

Time Lag and Soil Permeability in Ground water Observations. U.S. Army Corps Engineers. Waterways Exp. Sta. Bull. 36, Vicksburg, Miss.

Liberty, B.A. 1963:

Geology of Tweed, Kaladar and Bannockburn Map-Areas, Ontario. Geological Survey of Canada Paper 63 - 14, 15 p.

Ontario Ministry of the Environment. 1984:

Water Management. Goals, Policies, Objectives and Implementation Procedures of the Ministry of the Environment. 70 p.

Thornthwaite, C.W., and Mather, J.R. 1957:

Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance. Drexel Institute of Technology, Centerton, New Jersey, 311 p.

Victoria County Planning Department. 1975:

Victoria County Official Plan, Background Studies, Volume 1 Physical Base. 293 p.

APPENDIX I

MOE FILE INFORMATION

Department of Energy and Resources Management

Waste Management Branch

APPLICATION FOR A CERTIFICATE OF APPROVAL FOR A WASTE DISPOSAL SITE

TO: THE DEPARTMENT OF ENERGY AND RESOURCES MANAGEMENT
880 Bay Street,
Toronto, Ontario

To be submitted through Regional Waste Management Engineer

(1) Under the Waste Management Act, 1970 and the regulations, this application is made by Township of Somerville
Kenmount, Ont.

Owner of Facility

Address

(2) for the Renewal / Issue of a Certificate of Approval for a
Garbage Dump. Site

Delete item inapplicable

Type of Disposal

(3) located Part Lots 35 & 36 Front Range
Somerville Township

Full particulars of Location

(4) A ~~Certificate~~ / Provisional Certificate of Approval No. 3216.03 for this site was issued March 17 19 71

Delete item inapplicable

(5) No change in use, operation, or ownership of the site has occurred since the date of the original application.

Dated this Oct. 27 day of October 19 71

Signature of Applicant

DEPARTMENT
OF THE ENVIRONMENT
ONTARIO

OCT 29 1971

WASTE MANAGEMENT BRANCH
KINGSTON OFFICE

(6) The following changes in use, operation or ownership (have occurred since the date of the original application) (are proposed)
Have kept burned & buried every two weeks

Continued on Attached Sheets ☐

Delete item inapplicable

If necessary, provide additional details on separate sheets and attach to application.

(7) The site will be operated in accordance with The Waste Management Act, 1970 and the regulations by George Pearce
Cobourg, Ont.

Name of Operator

Address

The required supporting information to the application is appended hereto.

(8) Notice of this application has been published in the ..... on ....., ... and ..... 19..... and a copy of the notice is attached.

(9) A certificate that the site does not contravene any of the by-laws of the municipality is attached.

To be completed if applicant is other than a municipality

See notes on sections 1 to 9 on back of last copy (pink) which is to be retained by Applicant.

HALIBURTON, KAWARTHA, PINE RIDGE DISTRICT HEALTH UNIT

Charlotte M. Horner, B.A., M.D., D.P.H. – Medical Officer of Health

Inspection Report
General Sanitation

Date Received ..... Date of Inspection Feb. 12, 1971

Address of Premises: Part of Lots 35 & 36, Front Range - Somerville Twp.

Type of Premises Refuse Disposal Site.

Tenant ..... P.O. Address .....

Owner Twp. of Somerville P.O. Address Kinmount

Complainant ..... P.O. Address .....

Reason for Inspection Routine

REPORT This site is an open face dump serving the Village of Coboconk (Pop. 800) and surrounding area. Residents of Bexley Twp. also use this dump.

Observations: The dump face measures about 75' x 150'. There is little or no soil cover over rock in this general area and it is suspected that this is the case at the dump site although snow cover made it difficult to determine. Supposedly the dump is heavily infested with rats according to the clerk of Bexley Twp. , although none were observed during the inspection. The dump is accessible year round. The nearest dwelling is situated about ¼ mile away on the corner of the township road and the access road. The nearest watercourse is the Gull River about 1 mile away.

Comment: Mainly because of the lack of soil cover over rock and the difficulty encountered in drawing in fill to cover the refuse, the site is unsatisfactory.

Recommendation: Provisional certificate be issued with a time for expiry.

INSPECTOR M. D. Dawson

M.D.Dawson,C.P.H.I.(C)

(OVER)

WASTE MANAGEMENT BRANCH

RECOMMENDATION OF REGIONAL ENGINEER

NOTE: This form shall be submitted by the Regional Engineer to Head Office along with the application form and all supporting information.

(1) DATE APPLICATION RECEIVED: January 18, 1971 File: A 3216

(2) APPLICANT: Township of Somerville

(3) ISSUE: Certificate of Approval ☐

Provisional Certificate of Approval ☒

(4) TIME: Provisional Certificate to Expire in 1 months from date of issue.

(5) CONDITIONS OF ISSUE:

1) SUPPORTING INFORMATION FORM TO BE COMPLETED BY THE MUNICIPALITY & FORWARDED TO THIS OFFICE BY EXPIRY DATE.

(6) DO NOT ISSUE: REFUSE APPLICATION ☐

REVOKE (Cert. No.....) ☐

(7) REASONS FOR (6)

(8) DEFER: CIRCULATE TO:

FOR:

(9) DATE: FEB. 17/71 SIGNED: [signature]

Regional Engineer

Department of Energy and Resources Management
Waste Management Branch

ONTARIO

DEPT. OF ENERGY & RESOURCES MANAGEMENT
JAN 18 1971
WASTE MANAGEMENT BRANCH
DIVISION OFFICE

APPLICATION FOR A CERTIFICATE OF APPROVAL FOR A WASTE DISPOSAL SITE

TO: THE DEPARTMENT OF ENERGY AND RESOURCES MANAGEMENT
880 Bay Street,
Toronto, Ontario

To be submitted through Regional Waste Management Engineer

(1) Under the Waste Management Act, 1970 and the regulations, this application is made by Township of Somerville
Kinmount Ontario

Owner of Facility

Address

(2) for the Renewal / Issue of a Certificate of Approval for a
~~[illegible]~~ LANDFILL Site

Delete item inapplicable

Type of Disposal

(3) located Part of lots 35 & 36 Front Range
Somerville Township

Full particulars of Location

(4) A Certificate / Provisional Certificate of Approval No. ..... for this site was issued ..... 19.....

Delete item inapplicable

(5) No change in use, operation, or ownership of the site has occurred since the date of the original application.

Dated this 18th day of Nov. 1970

Ura G. Dettman
Signature of Applicant

(6) The following changes in use, operation or ownership (have occurred since the date of the original application) (are proposed)
have kept burned part time & buried
about every 2 weeks
Continued on Attached Sheets ☐

Delete item inapplicable

If necessary, provide additional details on separate sheets and attach to application.

(7) The site will be operated in accordance with The Waste Management Act, 1970 and the regulations by Jacob Gill
RR1 Kirkfield Ontario

Name of Operator

Address

The required supporting information to the application is appended hereto.

(8) Notice of this application has been published in the ——
..... on ——— and
..... 19..... and a copy of the notice is attached.

(9) A certificate that the site does not contravene any of the by-laws of the municipality is attached.

To be completed if applicant is other than a municipality

See notes on sections 1 to 9 on back of last copy (pink) which is to be retained by Applicant

SUPPORTING INFORMATION
TO AN
APPLICATION FOR APPROVAL
OF A
LANDFILL DISPOSAL SITE

1. Wastes to be Disposed of Comprise

Domestic	60 %
Commercial	25 %
Industrial Waste	3 %
Hauled Liquid Industrial Waste	%
Agricultural Waste	4 %
Hazardous Waste	2 %
Hauled Sewage	%
*Other	6 %
	100%

*Describe

Total 2 1/2 Tons/Day

Population Served 1000

2. Origin and Composition of Principal Components of Waste (other than domestic and commercial)

nil

3. Distance to Nearest Watercourse ..... Ft.
Distance to Source of Potable Water ..... Ft.
Distance to Dwelling ..... Ft.
Distance to Public Road 1000 Ft.
Distance to Cemetery 5280 Ft.

Total Area of Site 9 Acres
Anticipated Life 2 Years

General Description of Site

Rocky & 2' of dirt on top

4. Maximum Depth of Excavation Below Surface nil Ft
Maximum Height of Fill Above Surface 15 Ft
Type(s) of Material Encountered From Surface

clay loam 2 Ft
Ft
Ft

Depth of Watertable Below Surface 4 F
on Nov 1 (Date)

5. Proposed Future Land Use

no good for anything

6. Operating Equipment

~~20 hrs per month~~
Bulldozer shovel

Hours of Operation 20 hours per month

7. The Following Documents are Attached

FOR DEPARTMENTAL USE

8. Authorities Consulted:

Health Unit	☐ Objection	☐ No Objection
O.W.R.C.	☐ Objection	☐ No Objection
A.M.B.	☐ Objection	☐ No Objection
Municipality	☐ Objection	☐ No Objection
Conservation Authority	☐ Objection	☐ No Objection

Other (see Health Unit Inspection Report)

Commercial	[illegible] %
Industrial Waste	3 %
Hauled Liquid Industrial Wast	%
Agricultural Waste	4 %
Hazardous Waste	2 %
Hauled Sewage	%
*Other	6 %
	100%

Describe

Total $2\frac{1}{2}$ Tons/Day

Population Served 1000

nil

3. Distance to Nearest Watercourse ..... Ft.
Distance to Source of Potable Water ..... Ft.
Distance to Dwelling ..... Ft.
Distance to Public Road 1000 Ft.
Distance to Cemetery 5280 Ft.

Total Area of Site 9 Acres
Anticipated Life 2 Years
General Description of Site

Rocky & 2' of dirt on top

4. Maximum Depth of Excavation
Below Surface nil Ft.
Maximum Height of Fill
Above Surface 15 Ft.
Type(s) of Material Encountered
From Surface

Clay loam 2 Ft.

Ft.

Ft.

Depth of Watertable Below Surface + Ft.
on Mar. 1 (Date).

5. Proposed Future Land Use

no good for anything

6. Operating Equipment

~~2 times per month~~
Bulldozer shovel

Hours of Operation 20 hours per month

7. The Following Documents are Attached

Prepared by

Maurice Watson

DATED March 3/71

SIGNED Maurice Watson

FOR DEPARTMENTAL USE

8. Authorities Consulted:

Health Unit	☐ Objection	☐ No Objection
O.W.R.C.	☐ Objection	☐ No Objection
A.M.B.	☐ Objection	☐ No Objection
Municipality	☐ Objection	☐ No Objection
Conservation Authority	☐ Objection	☐ No Objection

Other (See Health Unit inspection report)

Inspection Record Forms Attached

Regional Engineer's Report Attached ☐

RECOMMENDATION

See Form 2.11

DATED Mar. 8/71

SIGNED [illegible]

WASTE MANAGEMENT BRANCH

RECOMMENDATION OF REGIONAL ENGINEER

NOTE: This form shall be submitted by the Regional Engineer to Head Office along with the application form and all supporting information.

(1) DATE APPLICATION RECEIVED: October 29, 1971 File: A 321603

(2) APPLICANT: Township of Somerville
Pt. Lots 35,36 Front Range

(3) ISSUE: Certificate of Approval ☐

Provisional Certificate of Approval ☒

(4) TIME: Provisional Certificate to Expire in 8 months from date of issue.

(5) CONDITIONS OF ISSUE:

1) ALL OPEN FACES TO BE PROPERLY GRADED, COMPACTED, & COVERED WITH AT LEAST TWO (2) FT. OF FILL
2) COMPLETE COVERAGE OF ALL REFUSE TO BE CARRIED OUT AT LEAST WEEKLY
3) RAT CONTROL PROGRAM TO BE INITIATED.
4) SITE TO BE ATTENDED DURING ALL OPEN HOURS & ADEQUATE GATES, FENCING, & SIGNS TO BE INSTALLED.

(6) DO NOT ISSUE: REFUSE APPLICATION ☐

REVOKE (Cert. No.....) ☐

(7) REASONS FOR (6)

(8) DEFER: CIRCULATE TO:

FOR:

ONTARIO

DEPARTMENT OF ENERGY AND RESOURCES MANAGEMENT
WASTE MANAGEMENT BRANCH

TELEPHONE
XXXXXX

XXXXXXXXXXXX
1 ST. CLAIR AVE. W.
TORONTO

FILE REF. No.: A.321603

WASTE DISPOSAL SITE
SOMERVILLE TOWNSHIP
LOTS 35 & 36, FRONT RANGE

Report by: P. E. Davidson, P. Eng.,
Regional Engineer,
Mideastern Region,
797 Princess Street,
Kingston, Ontario.

September 7, 1971.

R E P O R T

Report by: Mr. P. E. Davidson, P. Eng.,
Waste Management Engineer,
Mideastern Region,
Waste Management Branch,
Department of the Environment,
797 Princess Street,
Kingston, Ontario.

File No. A.321603

September 7, 1971.

GENERAL:

This site was inspected by the writer on September 1, 1971. It is one of three disposal sites serving the Township, population of which is 1310. (In the main, this site serves Coboconk and surrounding area)

DETAIL:

The site is located approximately 1 mile south-east of Coboconk, ¼ mile east of Highway 35. It is located 250 yds. south of the east-west township road and the same distance from the nearest dwelling which is located at the entrance to the site. The soil type in the vicinity is Dummer loam (shallow phase) over bedrock. There does not appear to be sufficient soil on-site to support a landfill operation. The closest watercourse is the Gull River which is approximately one mile away to the north-west. The site is apparently open at all hours although it was attended when inspected. Although covering has occurred recently on the top, the 12 foot high open sides have not been covered. There are no gates, signs, or fences and some open burning of refuse does take place.

CONCLUSIONS:

1) The operation of this site is not in accordance with Ontario Regulation 375/70.
2) The location of this site may be found to be unacceptable by the Township when the additional costs of trucking in fill are appreciated.

RECOMMENDATIONS:

1) All open faces should be properly graded, compacted, and covered with at least two (2) ft. of fill.
2) Complete coverage of all refuse to be carried out at least weekly.
3) Site to be attended during all open hours.
4) Adequate gates, fencing and signs to be installed.
5) Rat control program to be initiated.

P. E. Davidson, P. Eng.

PED/mp

Ontario

Ministry of the Environment

Waste Management Branch,
880 Bay Street, 3rd Floor,
Toronto, Ontario,
M5S 1Z8.

SITE RESUME

Date: April 27/73

Applicant: Township of Somerville File No. 321603

Location: Pt. Lots 35 & 36, Front Range, Somerville Twp.

Common Name (if applicable) Coboconk

Municipalities Served: Somerville Twp.

Population Served 1000 Type of Site Landfill

No. of Inspections: 2 Date of Last Inspection: Mar. 12/73

Upgrading proceeding under an Approved Program: Yes ____ No ____

Applicant's Attitude: Retarding the Efforts of Branch ____ Adequate ____

Current Status of Site:

Location:

Acceptable.

Operations:

Operation inadequate.

ONTARIO

MINISTRY OF THE ENVIRONMENT

Waste Management Branch,
797 Princess Street,
Kingston, Ontario.
K7L 1G1.

Telephone Area Code 613
546-3297

March 19, 1973.

File No. A.321601
A.321602
A.321603

Mrs. V. G. Byrne, Clerk,
Township of Somerville,
Kinmount, Ontario.

Re: Waste Disposal Sites
Lot 13, Conc. IV
Lot 1, Conc. XI
Part Lots 35 & 36, Front Range
Somerville Township

Dear Mrs. Byrne:

Routine inspections of these sites were conducted by staff of this Branch on March 12, 1973. The following inspection reports may act as a guide to Council regarding further site maintenance which is required. Please accept these comments as constructive criticism as we consider the action to date by Somerville Township Council to be very positive.

(1) Lot 13, Conc. IV
No. A.321601

This is a small site situated on shallow soil. The site is posted as being closed but no fence or gate has been established to limit access. The cover material applied at the time of closing did not completely cover all refuse. Complete covering of all refuse must be undertaken at the site. Some use of the site since its closing has resulted in a littering problem.

Recommendations:

1. Completely cover refuse with clean fill.
2. Establish a fence to control access to the site.
3. Maintain a litter control program at this site.

(2) Lot 1, Conc. XI
No. A.321602
(Kinmount)

The site was closed on June 30, 1972. All efforts regarding closing off have been well executed except the total covering of all refuse on site. The dumping area has been compacted and covered but the side face of the dump is still open. Broken glass and rusted steel remain exposed causing a potential hazard to persons entering the site.

Recommendation:

1. Completely cover refuse with clean fill.

(3) Part Lots 35 & 36, Front Range
A.321603
(Coboconk)

This is the largest of the three sites closed by Somerville Township in 1972. The 12 foot high banks of refuse extend approximately 400 feet along the north and west sides of the site. No successful attempt has been made by the township to properly grade and cover the open sides of the landfill. This requirement for closing off the site was first transmitted to Council in Mr. P. Davidson's report dated September 7, 1971.

The access road has been fenced and a sign noting the new site location has been erected.

Recommendations:

1. That the open garbage face should be reduced to a grade of one foot vertical drop over 3 feet horizontal run.
2. That this 1:3 slope should be compacted and covered with at least two feet of clean fill.

I would be pleased to meet with members of Council to discuss the work required to properly and adequately close the above noted site.

Yours very truly,

F. J. Iliffe

F. J. Iliffe, P. Eng.,
Regional Engineer,
Mideastern Region.

H. Avey/mp

Department of Energy and Resources Management

PROVISIONAL CERTIFICATE OF APPROVAL FOR A WASTE DISPOSAL SITE

Certificate No. 321603

Under **The Waste Management Act, 1970** and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to

Township of Somerville,
Kinmount,
Ontario

DEPARTMENT OF THE ENVIRONMENT ONTARIO
NOV 15 1971
WASTE MANAGEMENT BRANCH KINGSTON OFFICE

for the Landfill Site

located Part of Lots 35 and 36, Front Range, Township of Somerville

subject to the following conditions

1. That all faces including the working face are properly graded, compacted and covered with at least two (2) feet of fill.
2. That all refuse is covered at least once each week.
3. That a rodent extermination and control program is initiated immediately.
4. That the site is supervised during all open hours and that adequate gates, fencing and signs are installed.

This Provisional Certificate expires on the 15th day of July 1972.

Dated this 9th day of November 1971.

Ministry of the Environment
Ontario

INVENTORY OF MOE CERTIFIED WASTE DISPOSAL SITES
(active and closed)

Site Identification:

Number: 321603 Name: Coboconk Site

Applicant:

Individual/Business Name: Township of Somerville

Address: P.O. Box 59, Kinmount, Ontario

Telephone: 1-705-488-2571

Type of Applicant:

Private ☐

Industrial ☐

Municipality ☒

Type of Ownership:

☐ Proprietorship
Name if different than applicant:

☐ Partnership - Name all partners:

☐ Corporation: President's Name -

Land Owner: (If not applicant)

Name:

Site Location:

Descriptive Location

City ☐
Town ☐
Village ☐
Township ☐
Other ☐

Name: Somerville

Concession: Front Range
Lot Number: 35 and 36
Part of Lot:
Municipality:
Street Address:

Prepared and return location and site plan if not on your record. Note: Include all uses of all adjoining properties.

County Victoria

Electoral District Code 86

MOE Region C

MOE District Peterborough

Has the certificate been registered on title Yes ☐ No ☐

5. Type of Site:

Organic Soil Conditioning ☐ Transfer ☐ Landfilling ☒ Dump

Describe operations and process to be carried out on site: .....
.....Site closed - August 20th, 1974.....
.....

6. Site Characteristics:

Planning

a) Present land use .....Bush.....

b) Present official plan designation of site .....Rural.....

c) Present zoning category ....Rural.....

d) Present land use of all adjoining properties to be provided on location map....
.....Agricultural.....

e) Distance from any well water supply .....750 feet.....

f) Nearest water course: a) Name .....Gull River..... b) Distance .....1 mile.....

Physical Description

g) Rate at which site receives waste in (tons/cubic meters) per day.....Site closed.....

h) Life expectancy in years based on rate established in (g) .....N/A.....

i) Population served .....1,000.....

j) Total area of site (hectares) .....3.6.....

k) Total area approved to be filled (hectares).....N/A..... completed .....0.....not completed

o) Estimated capacity of site in tons or cubic meters .....N/A.....

Hydrogeology

p) Is there a hydrogeologic report available? Yes _____ No X

Author: .....

Client: .....

Date: .....

Location of report: .....

q) Based on a hydrogeologic appraisal by the Ground Water Evaluator

i) problems with contaminant discharge are likely _____ not likely _____

ii) problems with contaminant discharge are a reasonable possibility.
Yes _____ No _____

iii) there are insufficient data to form a reasonable opinion regarding i) and ii) above X.

iv) priority for further investigation: high _____ low X

reasons: _____

r) Are the wastes adjacent or near to gravels _____, sands _____, or bedrock X?

s) Is the site in an upland ___X___, or a lowland _____ area?

t) Is there a ground and/or surface water monitoring program for this site?

Yes _____ No ___X___

u) Have there been any problems with ground and/or surface water contamination?

Yes _____ No ___X___

v) Is the nearby ground or surface water presently being used?

Yes ___750'Well___ No _____

w) What is the potential use of nearby ground and surface water?

Recreational and Domestic Wells

x) Has leachate discharge been discussed ___No___? or calculated ___No___?

7. Eligible waste categories to be allowed at the site in percent of rate established in 6(g) above:

Domestic	Industrial	Hazardous	Others
60	3 *	2 *	10

Commercial

25

Limited to the class number

101 ☐	203 ☐	302 ☐	601 ☐
102 ☐	204 ☐	303 ☐	602 ☐
103 ☐	205 ☐	304 ☐	603 ☐
104 ☐	206 ☐	190 ☒	604 ☐
105 ☐	207 ☐	290 ☐	605 ☐
106 ☐	208 ☐	401 ☐	606 ☐
201 ☐	209 ☐	402 ☐	607 ☐
202 ☐	301 ☐		

Describe

Agricultural

* Dry construction material

8. Control System:

Is there any - Gas control system Yes ☐ No ☒

If yes, please describe .....

- Gas recovery system Yes ☐ No ☒

If yes, please describe .....

- Leachate on site treatment Yes ☐ No ☒

If yes, please describe.....

- Leachate off site treatment Yes ☐ No ☒

If yes, please describe .....

9. Recommendations for Certification:

Conditions:

Site is closed and should not be reopened nor certified

Reasons

10. Environmental Officer: Name:

Signature: Paul Chester

Date this form was completed: October 19th, 1979.

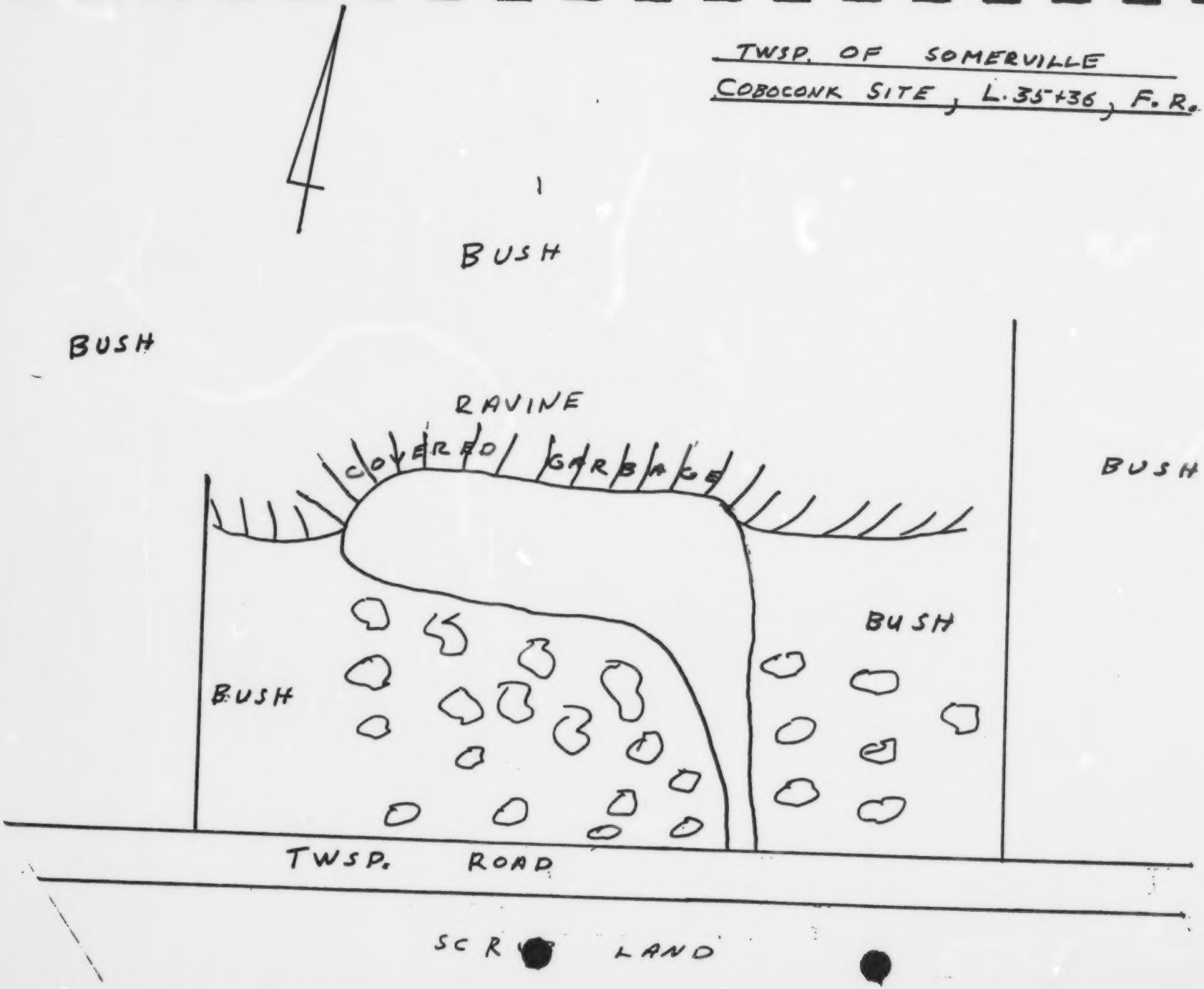
To be completed by the Environmental Approvals Branch.

11. Examined By: Certified correct:

Date:

TWSP. OF SOMERVILLE

COBOCONK SITE, L. 35+36, F. R.



(1) B-Bomt
(2) Jacques Paul K
(3) File - Bexley Twp? ~~[illegible]~~

WM-08-03

May 6, 1986

Township of Bexley
Coboconk, Ontario
K0M 1K0

Attention: Helen Russell
Clerk-Treasurer

Dear Mrs. Russell:

Re: Proposed Sale of Former Landfill Site
Parts of Lots 35 and 36, Front Range
Township of Somerville

In response to your letter of April 25th, 1986, regarding the aforementioned subject, please be advised that:

(1)our files indicate that the subject property was used as a landfill site from March 17, 1971, to August 20, 1974.

(2)under Section 45 of the Environmental Protection Act, "No use shall be made of land or land covered by water which has been used for the disposal of waste within a period of twenty-five years from the year in which such land ceased to be used unless the approval of the Minister for the proposed use has been given. R.S.O. 1980, c. 141, s.45, and

(3)it is our feeling that the owner(s) of the subject property have a moral obligation to inform the prospective buyer of the previous use of the property, the liabilities, and of the restrictions for its future use.

It is our understanding that the prospective buyer is Mr. Guy Mitchell, who plans to use this property to redirect runoff away from his present property and dwelling. As noted in the foregoing, any use of the subject property must receive approval from this Ministry.

Continued.../2

With respect to the question of putting the property up for Tender, we suggest that reference be made to the Municipal Act and/or your solicitor.

Should you have any questions regarding this matter, please contact me at this office.

Yours truly,

Clare Muisiner
Environmental Officer
Abatement East Section

CRM:bh

cc: Mr. M.J. McBride

Ministry of the Environment
Ontario

COMPUTER INVENTORY

OF

WASTE DISPOSAL SITES (LANDFILL)

Application/Certificate No. 321603

( ) 1 - Delete
2 - Add or New
3 - Change

If this inventory is for Notification of Changes fill in only the data which is being revised.

1. Site Disposition: Active ( ) Closed (x) Not Approved ( )

2. Applicant:

Municipal (x) Provincial ( ) Other ( )

Name: Coboconk Site

Address: P.O. Box 59 Postal Code

City/Prov.: Kinmount, Ontario Telephone: 705-488-2571

If Applicant not Municipal or Provincial complete the following:

( ) Proprietorship
Name, if different than applicant:

( ) Corporation: President's Name:

( ) Partnership - Name all partners:
(i) (ii)

3. Land Owner: (if not applicant)

Name:

Address:

4. Lessee (if applicable)

Name:

Address:

5. Site Operator

Name: Jacob Gill Title:

Address: R.R. #1, Kirkfield, Ontario

6. Site Location:

Municipality Name: Somerville Township Municipal Code 85

From Plan of Survey:

Mun. Name: Somerville Township Municipal Code 85

Concession: Front Range

Lot No: 35 and 36 Part of Lot: 35 and 36

Street Address:

7. **Geocode**

Zone _____ Easting _____ Northing _____

8. **Site Characteristics and Waste Category**

A. Rate at which site can receive waste per day.

Domestic 60% ( ) Tonnes ( ) Cu. Metres — Commercial 25% ( ) Tonnes ( ) Cu. Metres

Liquid Industrial 0 ( ) Tonnes ( ) Cu. Metres ( ) Litres — Hazardous 0 ( ) Tonnes ( ) Cu. Metres ( ) Litres

Non Hazardous Solid Industrial 3% ( ) Tonnes ( ) Cu. Metres — Other 10% ( ) Tonnes ( ) Cu. Metres

For each Category of Waste List the Class Number as per MOE Classification Guidelines. _____

190

B. Number of days/year the site is open 20 hrs./month

C. Population served 1,000

D. Names of all municipalities/major inindustries intended to be served by the site

1) Coboconk
2) Sommerville Township
3) _____
4) _____
5) _____

E. Total area of site 3.6 Hectares

F. Total area to be filled n/a Hectares

G. Estimated capacity of the site n/a Tonnes or _____ Cu. Meters

9. Control System

a. Monitoring for - Gas ( ) Yes (x) No - Ground Water ( ) Yes (x) No - Surface Water ( ) Yes (x) No

b. Control system for - Gas ( ) Yes (x) No - Gas utilization ( ) Yes ( ) No - Leachate ( ) Yes ( ) No

10. Hydrology

Author: _____

Date: _____

b. Hydrogeologic Appraisal by the Ground Water Evaluator:

Author: _____

Date: _____

11. A. Conditions for Certification Yes (x) No ( )

B. Has the certificate been registered on title Yes ( ) No (x)

C. Was there a Hearing Held Yes ( ) No (x)

D. Certificate issued by MOE Region ( ) Head Office (x)

12. A. Date Application was completed or changed November 18, 1970

B. Date Original Certificate was issued March 17, 1971

C. Date Waste Site Closed August 20, 1974

This inventory form was completed by: Paul Clarke

Approved by Environment Approval Branch for Computer Inventory

Signed _____

Ontario
Ministry of the Environment
Ministère de l'Environnement
Central Region
Région du Centre

139 George Street North
Peterborough Ontario
K9J 3G6
705/743-2972

139 nord, rue George
Peterborough (Ontario)
K9J 3G6
705/743-2972

Aug 31/87
NB WMB want to study this similar as for Ennismore
Jacque / B
If in agreement I will arrange with Tech Support agreed JB

File 401-08-05

January 14, 1987

To: Brian

From: Paul C.

Re: Closed Landfill Site - Coboconk - 321603
Somerville Township

I spoke with Mike McBride about this site. He didn't have much knowledge about it. However, he informed me the land had been sold to an adjacent landowner, Gilbert Mitchell, in 1986. Mr. Mitchell is aware of the closed site and of the 25 year rule. He uses the land for the storage of wood.

I spoke with Reeve Maurice Watson who reiterated the above. This site was used in conjunction with Bexley Township. This included the plywood company Vic-Ply. As far as the Reeve is aware there was no hazardous waste deposited at this site.

On the original application, dated March 3, 1971, "wastes to be disposed of comprise" should have read Industrial Waste - 5% instead of 3% and 2% hazardous waste.

Due to the nature of the land (lack of adequate soil material), proximity of new homes in the area and the importation of cover material, it is my estimation that a survey of the groundwater be conducted by this office, not W.M.B. I further suggest Derek and Ross be involved with this.

Paul Cleator

Environmental Officer
Abatement East Section

PDC:bh

cc: D. Smith/R. Hodgins

Municipality of the

Township of Somerville

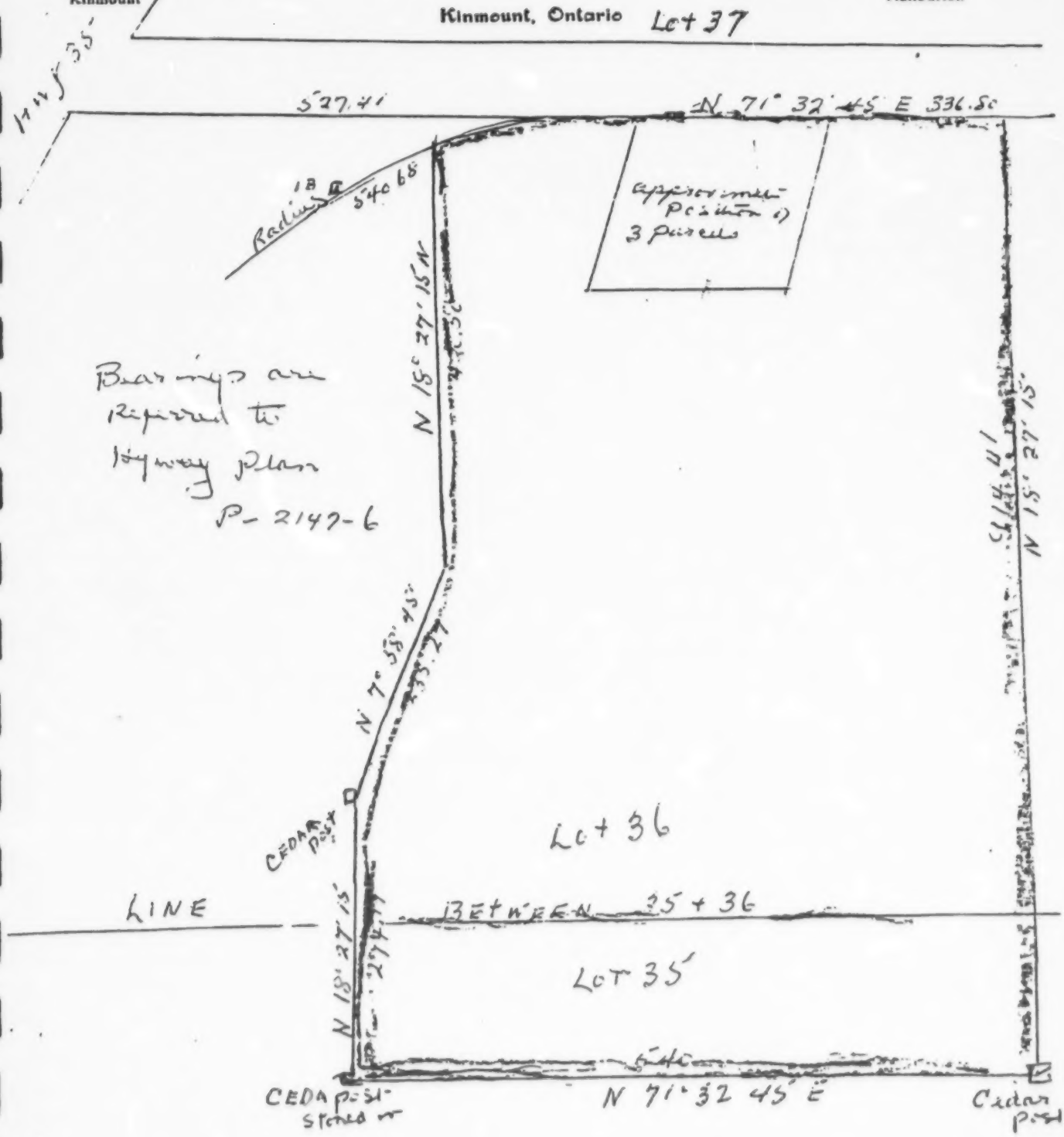
CHAS. O. HODGSON, Reeve
Burnt River

A. A. WILLIAMSON, Clerk
Treasurer and Tax Collector
Kinmount

C. P. BROHM, Assessor
Coboconk

DR. H. E. GOOD, M.O.H.
Haliburton

Kinmount, Ontario



APPENDIX II

- MOE COMPUTERIZED WATER WELL RECORDS
- MOE ORIGINAL WATER WELL RECORDS
- GLL WATER WELL RECONNAISANCE SURVEY FORMS

MUNICIPALITY CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
SOMERVILLE TOWNSHIP (CONTINUED....)															
RFC	28	64- 5281	673887 4944663	850	07/73	2517	6		54	25	50	5	4/20	DO	CRUICKSHANK I BLCK TPSL 0002 GREY CLAY BLDR 0039 GREY LMSN 0054
RFC	28	64- 4412	673910 4944680	850	04/71	2517	6	FR	41	20	20	7	1/00	DO	KAFFY S BRWN CLAY MSND BLDR 0018 BRWN FSND STNS 0041 GREY LMSN 0049
TC	29	64- 5973	673921 4944775	850	05/74	2517	6	FR	52	20	50	7	2/00	DO	KINSMAN ROBERT BLCK TPSL 0002 GREY LMSN BLDR CLAY 0040 GREY LMSN 0052
RFC	29	64- 7441	673930 4944740	850	09/75	1312	5	FR FR	20 38	8	22	30	2/00	DO	CARITARI MARCEL BRWN CLAY STNS HPAN 0020 BRWN STNS SAND 0038
RFC	29	64- 5807	674000 4944861	850	06/74	2515	6	FR	45	34	34	8	2/00	DO	CUICKSHANKS I GREY CLAY STNS 0043 GREY LMSN 0052
RFC	29	64- 5797	674028 4944917	850	08/74	2515	6	FR	30	22	36	5	2/00	DO	BINO A BRWN CLAY STNS 0027 WHIT LMSN SHLE 0032 WHIT LMSN 0039
RFC	29	64- 4577	674050 4944790	850	10/71	2517	6	FR	33	13	35	5	2/00	DO	GORDON T BLDR 0004 CLAY GRVL 0030 LMSN 0040
RFC	30	64- 6979	674080 4945010	850	05/77	2515	6	FR	18	2	18	2	2/00	DO	HOGAN JIM BRWN CLAY STNS 0017 GREY LMSN HARD 0029
RFC	30	64- 5972	674093 4945081	850	10/74	2517	6	FR	26	6	28	4	2/00	DO	LEADBEATER HAROLD BRWN CLAY BLDR 0019 GREY LMSN 0030
RFC	30	64- 2873	674150 4945200	875	09/63	1312	6	FR	51	10	25	15	1/00	DO	THOMPSON G W BLUE CLAY MSND HPAN 0051 LMSN SHLE 0052
RFC	30	64- 3545	674190 4945170	865	05/68	2548	6	FR	36	10	16	4	2/00	DO	KIRWAN G CLAY STNS 0030 LMSN 0036
RFC	31	64- 2875	674043 4945508	850	08/63	1312	6	FR	15	7	12	10	1/00	MU	DUNCOLMN LTD HPAN BLDR 0015 GREY SHLE 0018
RFC	31	64- 5811	674084 4945274	850	05/74	2515	6	FR	18	3	3	5	2/00	DO	HUCALUK FRED BRWN CLAY STNS GRVL 0016 GREY LMSN 0023
RFC	31	64- 7009	674120 4945350	850	05/77	2517	6	FR	22	3	25	3	2/00	DO	SLICHTER JOHN W BRWN TPSL 0001 GREY BLDR CLAY 0018 GREY LMSN 0021 GREY SHLE 0022 GREY LMSN 0028
RFC	31	64- 4709	674120 4945440	875	08/71	1312	6	FR	25	14	25	10	1/00	DO	MACEACHERN S GREY CLAY BLDR 0015 GREY LMSN 0030
RFC	31	64- 2876	674163 4945389	900	08/67	2516	6	FR	27	16	30	3	2/00	DO	WILCOCK J B BLDR 0006 SNDS 0026 LMSN 0040
RFC	31	64- 3543	674200 4945350	900	06/68	2517	6	FR	46	11	44	4	2/00	DO	SIFTON J A GREY CLAY STNS 0020 BLUE CLAY MSND 0045 LMSN 0054
RFC	31	64- 2874	674282 4945543	900	05/62	1312	6	FR	19	4	5	10	/30	DO	OAKES J H TPSL 0001 CLAY STNS 0019
RFC	32	64- 4121	674160 4945650	848	05/70	2517	6	FR	46	44	50	5	2/00	DO	BARTULZ J CLAY MSND 0015 CLAY 0040 SHLE 0045 LMSN 0052
RFC	32	64- 2879	674174 4945609	850	08/63	1312	6	FR	15	7	12	10	2/00	DO	DUNCOLMN HOLDINGS CLAY HPAN BLDR 0015 GREY LMSN SHLE 0018
RFC	32	64- 2880	674185 4945654	850	07/65	1312	6	FR	16	11	15	7	1/00	DO	DORLAND S M BRWN HPAN BLDR 0016 GREY LMSN SHLE 0019

RFC	32	64- 674207 2878 4945585	850 08/62	1312	6	FR	14	4	10	10	/30	DO		LUDMA E GREY CLAY BLDR 0014 GREY LMSN 0024
RFC	32	64- 674218 2877 4945715	850 05/62	1312	6	FR	25	10	20	10	1/00	DO		DUNBRAE HOLDINGS GREY CLAY STNS 0017 GREY LMSN 0027
RFC	33	64- 674250 4313 4945780	850 09/70	2517	6	FR	30	6	6	5	2/00	DO		SCOTT RUSSELL GREY CLAY STNS 0024 GREY LMSN 0031
RFC	34	64- 674740 2881 4946362	900 01/58	1344	6	FR	30	15	20	5	1/00	DO		FARROW H CLAY BLDR 0020 RSND 0030
RFC	35	64- 674770 6954 4946500	900 07/76	4512	5	FR FR	30 75	40	80	2	1/30	DO		TUETS H GREY SHLE LMSN 0006 GREY LMSN 0040 BRWN
RFC	35	64- 674770 6955 4946550	900 07/76	4512	6	FR	98	55	65	20	1/30	DO		LMSN 0060 GREY LMSN 0083 HUGHES EARL GREY LMSN 0040 BRWN LMSN 0060 GREY LMSN
RFC	36	64- 674731 2884 4946723	850 01/64	2516	6	FR	115	40	50	12	20/00	CO DO		0098 OLSEN W
RFC	36	64- 674900 8778 4946850	900 07/81	5415	6		48	15	30	5	24/00	DO		SHLE 0003 LMSN 0096 RED GRNT 0115 WILMS J
RFC	36	64- 674924 2885 4946906	900 03/66	2516		FR	40	4	40	4	1/00	DO		GREY LMSN 0048 MITCHELL G
RFC	36	64- 674950 5011 4946950	900 08/72	3324	6	FR	36	10	59	4	1/00	DO		PRDR 0022 LMSN 0051 MITCHELL G
RFC	36	64- 674956 2883 4947107	900 11/56	5423	6	FR	98	25	25	4	2/00	PS		GREY LMSN 0059 D M O
RFC	36	64- 675020 5012 4946950	900 08/72	5415	6	FR	21	10	15	6	1/00	DO		GREY LMSN 0102 MITCHELL G
RFC	36	64- 675476 2882 4947148	850 05/50	5423	5	FR	91	20				CO		GREY LMSN 0021 OLSEN W
RFC	36	64- 675486 2886 4947143	900 07/66	2516	6	FR	17	9	52	3	3/00	DO		TPSL 0005 LMSN 0091 BRADDOCK T
RFC	37	64- 674226 2888 4946823	850 10/50	4223	6	FR	27	9				DO		TPSL 0001 LMSN 0052 ROBERTSON W U
RFC	37	64- 674538 2889 4946910	850 11/50	4223	5	FR	30	8				DO		BLUE CLAY MPAN 0027 GROZELLE E
RFC	37	64- 674542 2892 4946957	850 11/60	1312	6	FR	25	8	15	5	1/00	DO		BLUE CLAY STNS 0030 WILKINSON L
RFC	37	64- 674606 2896 4947019	850 02/67	1312	6	FR	34	18	21	25	14/00	DO		BRWN CLAY BLDR 0024 SHLE 0025 WHALEN J
RFC	37	64- 674611 2891 4946978	850 11/60	1312	6	FR	30	10	20	5	1/00	DO		GREY MPAN BLDR 0018 GREY LMSN 0035 MCGINNIS G
RFC	37	64- 674635 2895 4947040	850 05/65	1312	6	FR FR	24 41	6	35	3	1/00	CO		BRWN CLAY BLDR 0025 LMSN 0031 BANK OF COMMERCE
RFC	37	64- 674637 2893 4946950	850 07/61	5423	6	FR	20	6	15	3	72/00	DO		MSND CLAY MPAN 0008 GREY CLAY MPAN 0015 GREY SHLE LMSN 0026 GREY LMSN 0042 WEAVER L
RFC	37	64- 674641 5562 4946970	855 01/74	5423	6	FR	29	15	25	10	2/00	DO		GREY CLAY BLDR 0020 GRVL 0021 PEARCE G
RFC	37	64- 674650 6948 4946950	860 11/76	5415	6	FR	34	10	20	5	2/00	DO		GREY CLAY BLDR 0015 GREY LMSN 0029 WEAVERS FRANK BLCK TPSL 0001 BRWN CLAY 0015 GREY LMSN
RFC	37	64- 674650 8100 4946950	870 11/79	5415	6	FR	22	5	7	20	2/00	DO		0034 RUSSELL K
RFC	37	64- 674683 2894 4947056	850 06/62	1312	6	FR	15	8	9	5	/30	DO		BLCK TPSL 0001 TPSL 0015 LMSN 0022 OLSON W BRWN CLAY BLDR 0004 GREY CLAY BLDR 0014
RFC	37	64- 674686 2890 4947102	850 05/40	5423	6	FR	40	3	40	5	4/00	DO		GRVL 0015 HUMPHRY H
RFC	37	64- 674700 8777 4946900	850 10/81	5415	6	FR	35	10	20	5	2/00	DO		BLUE CLAY BLDR 0017 LMSN 0040 NESBITT E BLCK TPSL 0001 CLAY BLDR 0010 GREY LMSN 0035

VICTORIA COUNTY 64

MUNICIPALITY CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
SOMERVILLE TOWNSHIP (CONTINUED....)															
RFC	37	64- 3450	674700 4947170	850	11/68	5415	6	FR	46	15	20	2	2/00	DO	ANGERS PAT TPSL 0001 GREY CLAY BLDR 0030 LMSN 0050
RFC	37	64- 2898	674705 4947132	850	10/67	2516	6	FR	24	4	10	5	3/00	DO	CATON B PRDG 0005 SHLE 0010 LMSN 0024
RFC	37	64- 9030	674750 4947050	900	11/82	5415	6	FR	22	10	15	5	2/00	DO	HENDERSON H BLCK TPSL 0001 CLAY BLDR 0015 LMSN 0022
RFC	37	64- 2887	674764 4947054	850	12/48	5423	5	FR	42	3				CO	BANK OF COMMERCE USND 0016 LMSN 0042
RFC	37	64- 2897	674788 4947089	850	06/67	5423	6	FR	24	6	16	2	2/00	DO	CATON B GREY SHLE 0010 GREY LMSN 0025
RFC	38	64- 9021	674600 4947400	900	08/82	5415	6	FR	60	20	40	3	2/00	DO	MCALLISTER M BLCK TPSL 0001 CLAY 0010 CLAY BLDR 0033 LMSN 0050 RED GRNT 0060
RFC	38	64- 7450	674700 4947300	850	05/76	1312	6	FR	38	9	28	10	1/00	DO	BOURNS TOM GREY CLAY MPAN BLDR 0020 GREY LMSN 0039
RFC	38	64- 2906	674702 4947322	850	12/63	1312	6	FR	20	8	10	10	1/00	DO	HALL D BRWN MPAN 0010 GREY MPAN 0016 GREY LMSN SHLE 0019 GREY LMSN 0026
RFC	38	64- 2910	674704 4947237	850	03/65	1312	6	FR	50	26	40	5	1/00	DO	LAKE S PRDG 0028 GREY CLAY MPAN 0045 SHLE LMSN 0051
RFC	38	64- 2908	674710 4947377	850	03/65	2516	6	FR	54	29	32	3	3/00	DO	CORMIER L PRDG 0026 CLAY STNS GRVL 0040 LMSN 0054
RFC	38	64- 4402	674720 4947300	850	05/71	1312	6	FR	50	25	47	10	1/00	DO	ANGLICAN CHURCH BRWN MPAN 0020 GREY MPAN 0042 GREY LMSN 0054
RFC	38	64- 2903	674757 4947313	850	07/54	2516	5	FR	44	17		2	1/00	DO	POVEY D BRWN CLAY STNS 0027 LMSN 0046
RFC	38	64- 2899	674759 4947243	850	01/49	5423	5	FR	12	6				DO	RUTTER W USND BLDR 0036 LMSN 0037
RFC	38	64- 2904	674783 4947464	850	05/59	2516	6	FR	44	11	11	5	1/30	DO	MAXBY G CLAY BLDR 0042 GRVL 0044
RFC	38	64- 2907	674792 4947336	850	11/64	1312	6	FR	28	14	20	5	2/00	DO	BRECHT F G BRWN CLAY MPAN BLDR 0016 GREY LMSN SHLE 0022 GREY LMSN 0028
RFC	38	64- 5636	674837 4947277	870	04/74	5423	6	FR	52	10	15	5	2/00	DO	RUTTER ARN BLCK TPSL 0001 GREY CLAY BLDR 0018 GREY LMSN 0054
RFC	38	64- 5480	674870 4947325	870	12/73	1312	6	FR	82	57	86	4	6/00	DO	RICHARDSON D BRWN CLAY STNS 0006 GREY LMSN 0092
RFC	38	64- 2902	674876 4947369	850	11/53	5423	5	FR	66	48		3	72/00	DO	WEAVER S GREY LMSN 0045 GRVL 0050 GREY LMSN 0066
RFC	38	64- 6406	674900 4937350	900	01/76	5423	6	FR	85	30	30		1/00	DO	HANDLEY DOUG GREY SHLE 0010 GREY LMSN 0085
RFC	38	64- 2901	674922 4947351	900	11/52	2516	5	FR	90	60		1	1/00	DO	FIELDER S E LMSN 0091
RFC	38	64- 5922	674989 4947472	900	12/74	5423	6	FR	90	50	50	1	1/00	DO	MACKAY CLARENCE GREY SHLE LMSN 0010 GREY LMSN 0090
RFC	38	64- 2909	674966 4947123	900	02/66	1312	6	FR	80	54	74	5	1/00	DO	WEAVER R CLAY 0002 GREY LMSN 0070 BRWN LMSN 0084

6404313

#6404313

County or District: Victoria | Township, Borough, City, Town, Village: Somerville | Con. Block, Tract, Survey, etc.: Con. Frontin-Gonk River | Lot: 033

Owner's Surname First: SCOTT, Russell | Address: Box 151 Bowmanville, Ontario | Date Completed: Day 02 Month 09 Year 70

17 67425.0 4845730 0850 15 24

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

General Colour	Most Common Material	Other Materials	General Description	Depth – Feet From	Depth – Feet To
Grey	Clay and Stone			0	24
Grey	Limestone Rock			24	31

31 0024 2512 0031 2515

32

41 WATER RECORD

Water Found at – Feet	Kind of Water
0030	X Fresh 2 Salty 3 Sulphur 4 Mineral
	1 Fresh 2 Salty 3 Sulphur 4 Mineral
	1 Fresh 2 Salty 3 Sulphur 4 Mineral
	1 Fresh 2 Salty 3 Sulphur 4 Mineral
	1 Fresh 2 Salty 3 Sulphur 4 Mineral

51 CASING & OPEN HOLE RECORD

Inside Diameter Inches	Material	Wall Thickness Inches	Depth – Feet From	Depth – Feet To
6¼ 06	X Steel 2 Galvanized 3 Concrete 4 Open Hole	.188	0	31 0031
	1 Steel 2 Galvanized 3 Concrete 4 Open Hole			
	1 Steel 2 Galvanized 3 Concrete 4 Open Hole			

SCREEN

Size of Opening (Slot No.) | Diameter Inches | Length Feet

Material and Type | Depth to Top of Screen Feet

61 PLUGGING & SEALING RECORD

Depth Set at – Feet From	To	Material and Type (Cement Grout, Lead Packer, Etc.)

PUMPING TEST

Pumping Test Method: 1 Pump X Bailer | Pumping Rate: 1465 GPH | Duration of Pumping: 02 Hours 00 Mins

Static Level	Water Level End of Pumping	Water Levels During Pumping: 15 Minutes	30 Minutes	45 Minutes	60 Minutes
006 Feet	006 Feet	006 Feet	006 Feet	006 Feet	006 Feet

Flowing Rate: GPM | Pump Intake Set at: 30 Feet | Water at End of Test: X Clear Cloudy

Recommended Pump Type: X Shallow Deep | Recommended Pump Setting: 030 Feet | Recommended Pumping Rate: 00.5 GPM

Water: 0100 GPM/Ft. Specific Capacity

FINAL STATUS OF WELL

X Water Supply; 2 Observation Well; 3 Test Hole; 4 Recharge Well; 5 Abandoned, Insufficient Supply; 6 Abandoned, Poor Quality; 7 Unfinished

WATER USE 01

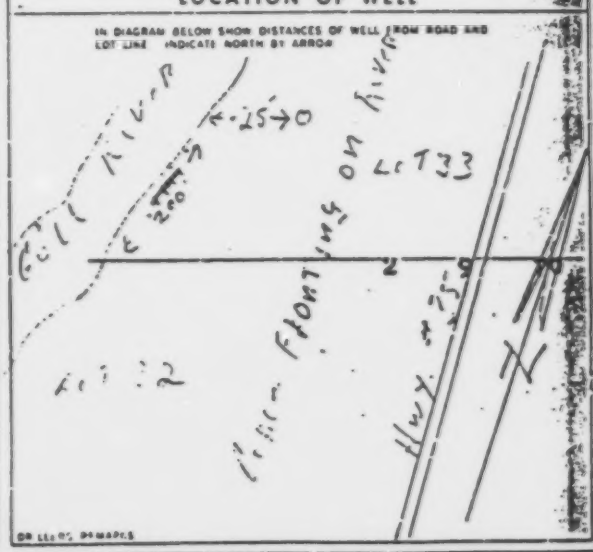
X Domestic; 2 Stock; 3 Irrigation; 4 Industrial; 5 Other; 6 Commercial; 7 Municipal; 8 Public Supply; 9 Cooling or Air Conditioning; 10 Not Used

METHOD OF DRILLING

X Cable Tool; 2 Rotary (Conventional); 3 Rotary (Reverse); 4 Rotary (Air); 5 Air Percussion; 6 Boring; 7 Diamond; 8 Jetting; 9 Driving

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Distances, Remarks

CONTRACTOR

Name of Well Contractor: G. HART AND SONS | License Number: 2517

Address: R.R.1, Fenelon Falls, Ontario

Kenneth H. Hart

USE ONLY

Date Received: 1 | By: 2517 | Date Completed: 12 02 71

Date of Map: No. | Inspector

P/T.B.

64 2881

Water-Well Record

#64 2881

County or Territorial District: Victoria — Township, Village, Town or City: Somerville

Con. F.R. — Lot: 34 — Street and Number (if in Village, Town or City):

Owner: H. F[illegible] — Address: Cobourg

Date completed: 8 (day) Jan (month) 28 (year)

Pipe and Casing Record

Casing diameter(s): 5 5/8"

Length(s): 30'

Type of screen: NONE

Length of screen:

Pumping Test

Static level: 15 ft

Pumping rate: 300 gal per hr

Pumping level: 20 ft

Duration of test: 1 hr

Well Log / Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
[illegible]	0	20	30 ft	15 ft	fresh
[illegible]	20	30	[illegible]		

For what purpose(s) is the water to be used? Permanent Residence

Is water clear or cloudy? clear

Is well on upland, in valley, or on hillside? upland

Drilling firm: Wm. H. Baldwin

Address: [illegible]

Name of Driller: [illegible]

Address: [illegible]

Licence Number: 11 5[illegible]

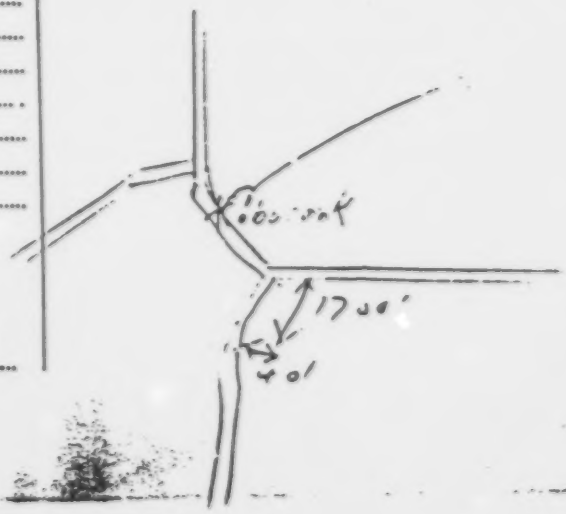
I certify that the foregoing statements of fact are true.

Date: Jan 9/58 — [illegible] Baldwin

Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 5

Ontario

PRINT ONLY IN SPACES PROVIDED

LOG OF OVERBURDEN AND BEDROCK MATERIALS

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIAL	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
Grey	Limestone			0	40
Brown	Limestone			40	60
Grey	Limestone			60	98

WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
098	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL

CASING & OPEN HOLE RECORD

INSIDE DIAM.	MATERIAL	WALL THICKNESS	DEPTH - FEET
06	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE		0 - 188

SCREEN

DIAMETER	SLOT NO.	MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN

PLUGGING & SEALING RECORD

DEPTH SET AT - FEET	MATERIAL AND TYPE

PUMPING TEST

METHOD	RATE	DURATION
☐ PUMP ☐ BAILER	00 30 GPM	01 HOURS 30 MINUTES

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING PUMPING	RECOVERY
055 FEET	065 FEET	15 MINUTES 055 FEET; 30 MINUTES 055 FEET; 45 MINUTES 055 FEET	15 MINUTES 055 FEET

IF FLOWING GIVE RATE: GPM

PUMP INTAKE SET AT: 90 FEET

WATER AT END OF TEST: ☐ CLEAR ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☐ DEEP

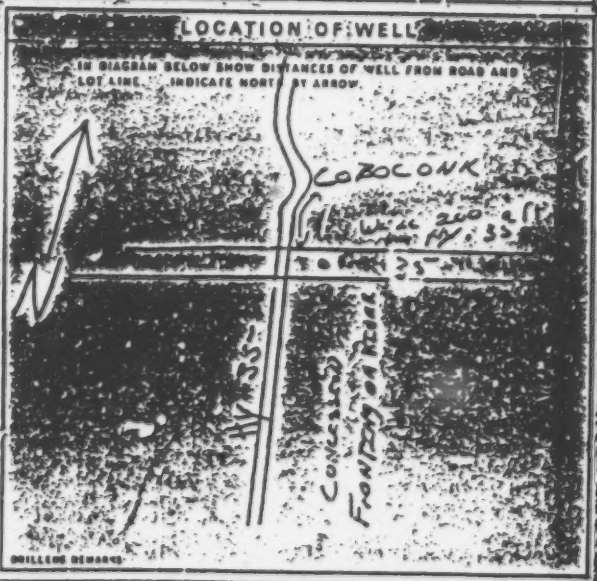
RECOMMENDED PUMP RATE: 00 GPM

RECOMMENDED SETTING: 090 FEET

GPM/FT. SPECIFIC CAPACITY

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS

FINAL STATUS OF WELL: ☐ WATER SUPPLY ☐ OBSERVATION WELL ☐ TEST HOLE ☐ RECHARGE WELL ☐ ABANDONED, INSUFFICIENT SUPPLY ☐ ABANDONED, POOR QUALITY ☐ PREFINISHED

WATER USE: 01 ☐ DOMESTIC ☐ STOCK ☐ IRRIGATION ☐ INDUSTRIAL ☐ OTHER ☐ COMMERCIAL ☐ MUNICIPAL ☐ PUBLIC SUPPLY ☐ COOLING OR AIR CONDITIONING ☐ NOT USED

METHOD OF DRILLING: ☐ CABLE TOOL ☐ ROTARY (CONVENTIONAL) ☐ ROTARY (REVERSE) ☐ ROTARY (AIR) ☐ AIR PERCUSSION ☐ BORING ☐ DIAMOND ☐ JETTING ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: Lenrich Drilling LICENCE NUMBER: 4512

ADDRESS: RR 1 Kin

USE ONLY

DATE RECEIVED: 1 | 77 | 04 | 12 | 05 | 04 | 77

DATE COMPLETED: 05 | 04 | 77

Ontario

1. PRINT ONLY IN BLACK CARBON INK
2. CHECK ☑ CORRECT BOX WHERE APPLICABLE

6705854 | 640128 REC

CONTRACTOR NUMBER | CONTRACTOR'S NAME | FOR PLACE-PACK WELLS ONLY | 035

WELL OWNERS FIRST NAME | SURNAME | DATE COMPLETED 04 07

21 17 674770 4946500 5 10900 6 24

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
GREY	SHALE	LIMESTONE		0	16
GREY	LIMESTONE			16	46
GREY	LIMESTONE			46	66
GREY	LIMESTONE			66	83

31 0068117185 0040215 0060645 0083215

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
003 0	☑ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
0075	☑ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WELL THICKNESS	END DEPTH FEET
6	☑ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE	8	75 004
	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE		
	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE		
	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE		

SCREEN: DIAMETER OF OPENING (SLOT NO.) | DIAMETER INCHES | LENGTH FEET | MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: ☐ PUMP ☐ BAILER | PUMPING RATE 002 | DURATION OF PUMPING 01 HOURS 30 MINS

STATIC LEVEL	PUMPED LEVEL END OF PUMPING	WATER LEVELS DURING PUMPING OR RECOVERY	20 MINUTES	30 MINUTES	40 MINUTES
040 FEET 40	080 FEET 80	055 FEET 55	040 FEET	040 FEET	040 FEET

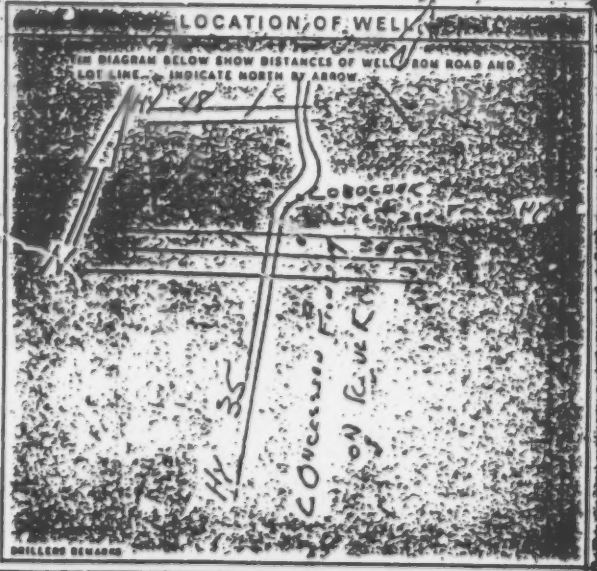
IF FLOWING, GIVE RATE | PUMP INTAKE SET AT FEET | WATER AT END OF TEST ☐ CLEAR ☐ CLOUDY

RECOMMENDED PUMP TYPE ☐ SHALLOW ☐ DEEP | RECOMMENDED PUMP SETTING FEET | RECOMMENDED PUMPING RATE

GPM./FT. SPECIFIC CAPACITY

LOCATION OF WELL

THE DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS

FINAL STATUS OF WELL: ☑ WATER SUPPLY ☐ OBSERVATION WELL ☐ TEST HOLE ☐ RECHARGE WELL ☐ ABANDONED, INSUFFICIENT SUPPLY ☐ ABANDONED, POOR QUALITY ☐ UNFINISHED

WATER USE 01: ☐ DOMESTIC ☐ STOCK ☐ IRRIGATION ☐ INDUSTRIAL ☐ OTHER ☐ COMMERCIAL ☐ MUNICIPAL ☐ PUBLIC SUPPLY ☐ COOLING OR AIR CONDITIONING ☐ NOT USED

METHOD OF DRILLING: ☐ CABLE TOOL ☐ ROTARY (CONVENTIONAL) ☐ ROTARY (REVERSE) ☐ ROTARY (AIR) ☐ AIR PERCUSSION ☐ BORING ☐ DIAMOND ☐ JETTING ☐ DRIVING

ACTOR | NAME OF WELL CONTRACTOR | LICENCE NUMBER

SE ONLY | DATE RECEIVED | 45 12 | DATE RECEIVED 1050477

Ontario of the Environment

17/80

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 6411200 64012

COUNTY OR DISTRICT	TOWNSHIP BOROUGH CITY TOWN VILLAGE	CON BLOCK TRACT SURVEY ETC	LOT
Vict	Somerville	Front Range Part	35

OWNER (SURNAME FIRST)	ADDRESS	DATE COMPLETED
Mitchel Lu	Coboconk	DAY 17 MO 5 YR 88

21

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH FEET FROM	DEPTH FEET TO
	Topsoil			0	1
	Clay			1	4
	Limestone			4	92

31

32

41 WATER RECORD

WATER FOUND AT FEET	KIND OF WATER
90	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH FEET FROM	DEPTH FEET TO
6 1/4	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	188	0	21
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET

MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER ETC.)

71 PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 ☐ PUMP 2 ☐ BAILER	20 GPM	1 HOURS MINS

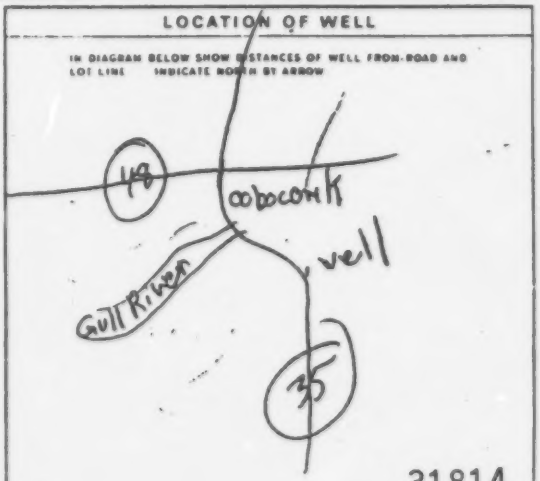
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING 1 ☐ PUMPING 2 ☐ RECOVERY: 15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
31 FEET	60 FEET	FEET	FEET	FEET	60 FEET

FLOWING GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM	85 FEET	1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	FEET	10 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW



31814

DRILLERS REMARKS

FINAL STATUS OF WELL

1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED INSUFFICIENT SUPPLY 6 ☐ ABANDONED POOR QUALITY 7 ☐ UNFINISHED 8 ☐ DEWATERING

WATER USE

1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF CONSTRUCTION

1 ☒ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING ☐ DIGGING ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR	WELL CONTRACTOR'S LICENCE NUMBER
Sonia Wann	5415

ADDRESS: Coboconk

NAME OF WELL TECHNICIAN	WELL TECHNICIAN'S LICENCE NUMBER
Paul Wann	T-02466

SIGNATURE OF TECHNICIAN/CONTRACTOR	SUBMISSION DATE
Sonia Wann	DAY 18 MO 5 YR 88

OFFICE USE ONLY

DATA SOURCE	CONTRACTOR	DATE RECEIVED
	5415	JUN 21 1988

DATE OF INSPECTION | INSPECTOR

REMARKS

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

The Ontario Water Resources Commission Act

WATER WELL RECORD

GROUND WATER BRANCH 64 MAY 25 1964 ONTARIO WATER RESOURCES COMMISSION

Basin County or District: Victoria

Township, Village, Town or City: Somerville

Con: FOR Lot: 36

Date completed: 10 (day) JAN (month) 1964 (year)

Owner: V. OLSEN (print in block letters)

Address: Cabuconk

Casing and Screen Record

Inside diameter of casing	6¼
Total length of casing	96 ft.
Type of screen	—
Length of screen	—
Depth to top of screen	—
Diameter of finished hole	6¼"

Pumping Test

Static level	40 ft.
Test-pumping rate	12 G.P.M.
Pumping level	50 ft.
Duration of test pumping	20 HRS.
Water clear or cloudy at end of test	CLEAR
Recommended pumping rate	12 G.P.M.
with pump setting of	90 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
SHALE ROCK	0	3		
LIMESTONE ROCK	3'	96'		
RED GRANITE	96'	115'	115'	FRESH

For what purpose(s) is the water to be used? HOUSE & GARAGE

Is well on upland, in valley, or on hillside? UPLAND

Drilling or Boring Firm: C. HART & SON

Address: R. R. #1 FENELON FALLS

Licence Number: 818

Name of Driller or Borer: DON HART

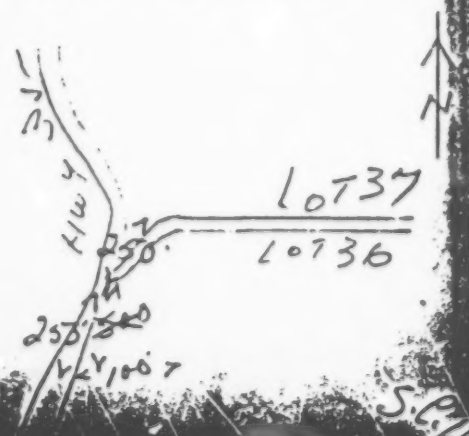
Address: SAME AS ABOVE

Date: JAN. 14 1964

[signature]
(Signature of Licensed Drilling or Boring Contractor)

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 15M-60-4138

O.W.R.C. COPY

Owner DEPT of HIGHWAYS Shed Address #2883

Date completed 1 NOV 56
(day) (month) (year)

Pipe and Casing Record

Casing diameter(s) 5 5/8
Length(s) 14
Type of screen
Length of screen

Pumping Test

Static level 25
Pumping rate 25 GPH
Pumping level 25
Duration of test 2 HRS

Well Log

Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
GREY-LIMESTONE	0	102	98	77	FRESH

For what purpose(s) is the water to be used? D H O SHED

Is water clear or cloudy? CLEAR

Is well on upland, in valley, or on hillside? UPLAND

Drilling firm

Address

Name of Driller C D WEAVER

Address CABOCONG

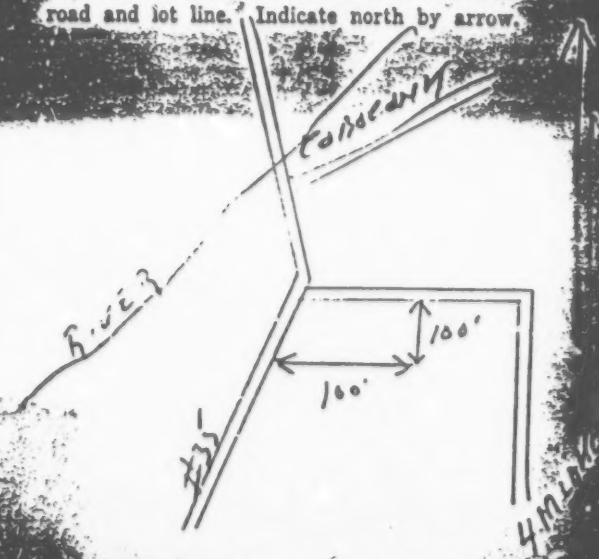
Licence Number 27

I certify that the foregoing statements of fact are true.

Date Jan 24 /57 C D Weaver
Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 3

GEOLOGICAL BRANCH
DEPARTMENT OF MINES

The Well Drillers Act
Department of Mines, Province of Ontario

Water Well Record

County or District: Victoria Tp. Sepe Vill Con. F.R. Lot 36 Pt. Lot
Owner: Walter Olsen Address: Coboconk Acres
Date Completed: May/30 Cost of Well (not including pump)

Pipe and Casing Record

Casing diameter(s)
Length(s) of casing(s) 5 ft
Length of screen
Type of screen
Type of pump
Capacity of pump
Depth of pump setting

Pumping Test

Date
Developed Capacity
Duration of Test
Pumping Rate
Drawdown
Static level of completed well 20'
Is well a gravel-wall type?

Water Record

Kind (fresh or mineral) fresh
Quality (hard, soft, contains iron, sulphur etc.) hard
Appearance (clear, cloudy, coloured) Clear
For what purpose(s) is the water to be used? Garage use
How far is well from possible source of contamination? 100 ft
What is source of contamination?
Enclose a copy of any mineral analysis that has been made of water none

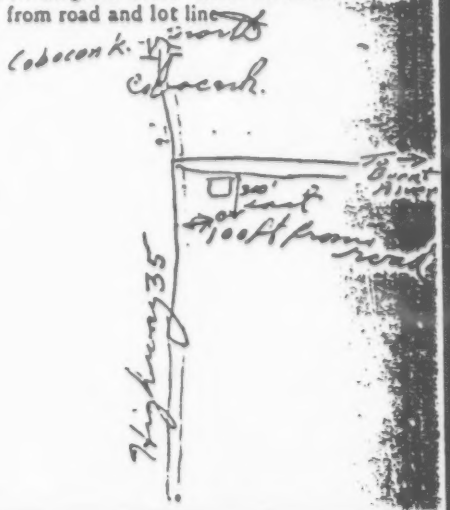
Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
20 ft from	good hard	71 ft
surface	water	

Well Log

Drift and Bedrock Record	From	To
5 ft of Casing and 36 ft of limestone Rock.	0 ft.	..... ft.
overburden	0	5
limestone	5	91

Location of Well

In diagram below show distances of well from road and lot line



Situation: Is well on upland, in valley, or on hillside? upland
Drilling Firm E. J. Meaner

Ministry of the Environment

26/41

The Ontario Water Resources Act

WATER WELL RECORD

31610

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK (✓) APPROPRIATE BOX WHERE APPLICABLE

(11) 6408778 | 64012 | REG

County or District: Vict
Township or Municipality or Village: Somerville
Lot: 6 | Con: FRC | Block, Tract, Survey, etc.: | Plan: 036
Name of Owner: John Wilms
Address: Coboconk
Date Completed: Day 20 Month 07 Year 81

(21) Zone: 17 | Easting: 674900 | Northing: 4946850 | Elevation: 0900 | Data Code: 24

WILMS, John

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

General Colour	Most Common Material	Other Materials	General Description	Depth Feet From	Depth Feet To
Gray	Limestone			0	48

MOE VF-18

(31) 0048216

(32)

(41) WATER RECORD

Water Found at Feet	Kind of Water
048	#5 Fresh / Sulphur / Mineral

(51) CASING & OPEN HOLE RECORD

Inside Diam Inches	Material	Wall Thickness	From Feet	To Feet
06	4		0	0010

SCREEN

Size-Slot of Opening | Diameter | Length
Material and Type | Depth to Top of Screen

(61) PLUGGING & SEALING RECORD

Depth Set at Feet From | To | Material and Type | Depth to Top of Seal

PUMPING TEST

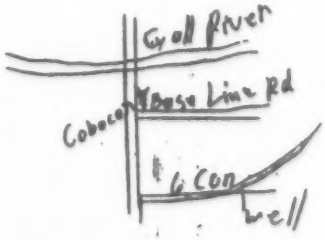
Pumping Test Method: 1 Pump 6 Bailer
Pumping Rate: 0005
Duration of Pumping: 24 Hours 00 Minutes
Static Level: 015
Water Level end of Pumping: 030
Water Levels during Pumping: 1 Pumping 2 Recovery

15 Minutes	30 Minutes	45 Minutes	60 Minutes
030	030	030	030

Recovery Water Level Measured
Recommended Pump Type: 1 Shallow 6 Deep
Recommended Pump Setting: Feet
Recommended Pump Capacity
Water at End of Test: 1 Clear 2 Cloudy
Recommended Pumping Rate: 0005

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



5369
Drillers Remarks

FINAL STATUS OF WELL 1
1 ☑ Water Supply
2 ☐ Observation Well
3 ☐ Test Hole
4 ☐ Recharge Well
5 ☐ Abandoned Insufficient Supply
6 ☐ Abandoned Poor Quality
7 ☐ Unfinished

WATER USE 01
1 ☑ Domestic
2 ☐ Stock
3 ☐ Irrigation
4 ☐ Industrial
5 ☐ Other
6 ☐ Municipal
7 ☐ Public Supply
8 ☐ Cooling or Air Conditioning
9 ☐ Not Used

METHOD OF DRILLING 1
1 ☑ Cable Tool
2 ☐ Rotary (Conventional)
3 ☐ Rotary (Reverse)
4 ☐ Rotary (Air)
5 ☐ Air Percussion
6 ☐ Boring
7 ☐ Diamond
8 ☐ Jetting
9 ☐ Driving

CONTRACTOR

Name of Well Contractor: Sonda Wenner | Licence Number: 5415
Address: Coboconk
Name of Driller or Borer: Wenner Well Drilling | Licence Number: 5415
Signature of Contractor: Sonda Wenner | Submission Date: Day 13 Month 1 Year 82

OFFICE USE ONLY

Date Received: 1 | Contractor: 5415 | 290182
Date of Inspection | Inspector
Remarks

64 No 2886

The Ontario Water Resources Commission Act

WATER WELL RECORD

Basin 24

County or District VICTORIA

Township, Village, Town or City SOMERVILLE

Con. F. RANGE Lot ~~25~~ 36

Date completed 14 (day) JULY (month) 1966 (year)

Owner MR. TIM BRADDOCK (print in block letters)

Address R. R. #. I. FENELON FALLS

Casing and Screen Record

Inside diameter of casing 6¼"

Total length of casing 9'

Type of screen

Length of screen

Depth to top of screen

Diameter of finished hole 6¼"

Pumping Test

Static level 9'

Test-pumping rate 3 G.P.M.

Pumping level empty

Duration of test pumping 3 hrs.

Water clear or cloudy at end of test clear

Recommended pumping rate 2 G.P.M.

with pump setting of 50' feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
TOP SOIL	0	I	I7	FRESH
LIMESTONE ROCK	I	52		

For what purpose(s) is the water to be used? HOUSE

Is well on upland, in valley, or on hillside? UPLAND

Drilling or Boring Firm G. HART & SONS

Address R. R. #. I. FENELON FALLS

Licence Number 2242

Name of Driller or Borer DONALD HART

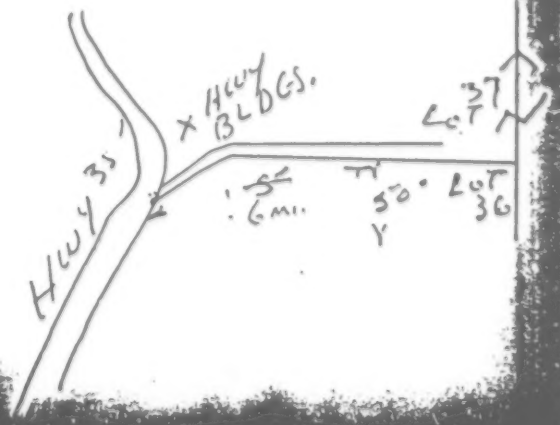
Address R. R. #. 3. FENELON FALLS

Date JULY 14, 1966

(Signature of Licensed Drilling or Boring Contractor)

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 7 15M-60-4138

O.W.R.C. COPY

Front Range

The Ontario Water Resources Commission Act

WATER WELL RECORD

Ontario Water Resources Commission
Division
1966

Basin 24 Victoria

County or District

Township, Village, Town or City Somerville

Con. 7 Lot 36 Front Range

Date completed 25 (day) March (month) 1966 (year)

Owner Gilbert Mitchell (print in block letters)

Address P.O. Box 1. Cobocank Ont

Casing and Screen Record

Inside diameter of casing ~~5 1/4~~ 5 5/8"

Total length of casing

Type of screen

Length of screen

Depth to top of screen

Diameter of finished hole 5 inches

Pumping Test

Static level 4 ft

Test-pumping rate 4 G.P.M.

Pumping level 40 ft

Duration of test pumping 1 hr

Water clear or cloudy at end of test Clear

Recommended pumping rate 4 G.P.M.

with pump setting of 50 feet below ground surface

Well Log

Drilled Well Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
Deepened ~~Brown Clay~~ limestone rock	22	51	40'	fresh

For what purpose(s) is the water to be used? house

Is well on upland, in valley, or on hillside? upland

Drilling or Boring Firm George Hart & Sons

Address R.R. # 3. Fenelon Falls, Ont.

Licence Number 1965

Name of Driller or Borer GEORG HART

Address same as above

Date March 25/66

G. Hart

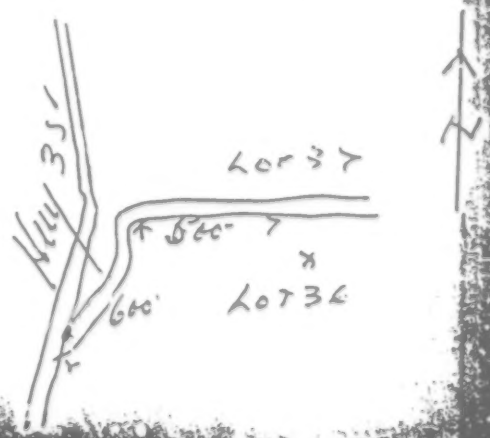
(Signature of Licensed Drilling or Boring Contractor)

(Per M. H)

Form 7 15M-60-4138

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



OWRC COPY

ONTARIO

6405012

County: VICTORIA | Township: BEXLEY | City: MINDEMOYA | Lot: 036 | Concession: FRONT RIVER

Owner: MITCHELL, GEO. | Address: COBBORN ONTARIO | Date completed: 05 08 72

17 | 675020 | 4946950 | 0900 | 6 | 24

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

General Colour	Most Common Material	Other Materials	General Description	Depth - Feet From	To
Grey	Limestone			0	21

31 0021.215

32

41 WATER RECORD

Water Found at Feet	Kind of Water
0021	X Fresh 2 Salty 3 Sulphur 4 Mineral

51 CASING & OPEN HOLE RECORD

Inside Diameter Inches	Material	Wall Thickness Inches	Depth - Feet From	To
06	X 1 Steel 2 Galvanized 3 Concrete 4 Open Hole	.188	0	0006
06	X 1 Steel 2 Galvanized 3 Concrete 4 Open Hole		6	0021

SCREEN

Size of Opening (Slot No.) | Diameter | Length

Material and Type | Depth to Top of Screen

61 PLUGGING & SEALING RECORD

Depth Set at - Feet From	To	Material and Type (Cement Grout, Lead Packer, Etc.)

71 PUMPING TEST

Pumping Test Method: 1 Pump X 2 Bailer

Pumping Rate: 0006 GPM

Duration of Pumping: 01 Hours 00 Mins

Static Level	Water Level End of Pumping	15 Min.	30 Min.	45 Min.	60 Min.
010	015	010	010	010	010

X Pumping 2 Recovery

X Clear 2 Cloudy

Recommended Pump Type: X Shallow 2 Deep

Recommended Pump Setting: 019

Recommended Pump Rate: 0005 GPM

001.2 GPM at Specific Capacity

FINAL STATUS OF WELL

X 1 Water Supply 2 Observation Well 3 Test Hole 4 Recharge Well 5 Abandoned, Insufficient Supply 6 Abandoned, Poor Quality 7 Unfinished

WATER USE

01 X 1 Domestic 2 Livestock 3 Irrigation 4 Industrial 5 Municipal 6 Commercial 7 Cooling or Air Conditioning 8 Other

METHOD OF DRILLING

X 1 Cable Tool 2 Rotary (Conventional) 3 Rotary (Air) 4 Diamond 5 Jetting 6 Driving 7 Digging 8 Other

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate North by arrow.

Contractor: G. Weaver

Date: 5415

121272

6405611 64012 REC

2 CHECK ☒ CORRECT BOX WHERE APPLICABLE

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
VICTORIA	~~[illegible]~~ WOMMERVILLE	Conc ~ Fr. on River	036

OWNER (SURNAME FIRST)	ADDRESS	DATE COMPLETED
~~[illegible]~~ MITCHELL G.	C. Cobocook ONTARIO	15 08 72

17	674950	4946520	0900	6	24

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
Grey	Limestone			0	59

31 0059215

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0036	☒ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
06 ~~4~~	☒ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE	.188	0	~~6~~ 0006
06 ~~4~~	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☒ OPEN HOLE	1	6	0059 ~~59~~
	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE			

SCREEN

SIZE OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET

MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

PUMPING TEST

PUMPING TEST METHOD	PUMP RATE	DURATION OF PUMPING
☐ PUMP ☒ BAILER	0004 GPM	01 HOURS 00 MINUTES

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING ☐ PUMPING ☒ RECOVERY			
010 FEET	059 FEET	~~25~~ 025 FEET	30 MINUTES 010 FEET	45 MINUTES 010 FEET	60 MINUTES 010 FEET

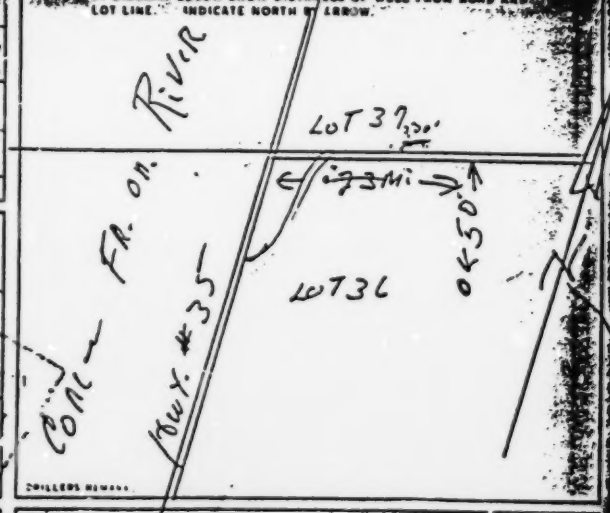
IF FLOWING GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM	FEET	☒ CLEAR ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	055 FEET	0004 GPM

000.1 GPM PER SPECIFIC CAPACITY

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS

FINAL STATUS OF WELL

☒ WATER SUPPLY ☐ OBSERVATION WELL ☐ TEST HOLE ☐ RECHARGE WELL ☐ ABANDONED INSUFFICIENT SUPPLY ☐ ABANDONED POOR QUALITY ☐ UNFINISHED

WATER USE

01

☒ DOMESTIC ☐ STOCK ☐ IRRIGATION ☐ INDUSTRIAL ☐ OTHER ☐ COMMERCIAL ☐ MUNICIPAL ☐ PUBLIC SUPPLY ☐ COOLING OR AIR CONDITIONING ☐ NOT USED

METHOD OF DRILLING

☒ CABLE TOOL ☐ ROTARY (CONVENTIONAL) ☐ ROTARY (REVERSE) ☐ ROTARY (AIR) ☐ AIR PERCUSSION ☐ BORING ☐ DIAMOND ☐ JETTING ☐ DRILLING

NAME OF WELL CONTRACTOR	CABLE NUMBER
C. WEAVER	3324

ADDRESS: Cobocook Ontario

1	3324	121272	

DATE OF INSPECTION: 5 11 73

Sample Number H1, Assumed MOE Water Well Record Number 2884

WATER WELL RECONNAISSANCE SURVEY

Sheet___of___

PROJECT NAME Coboconk PROJECT NO 88-237

PERSON INTERVIEWED Gene Suggitt RESIDENCE Texaco

DATE August 24/88 TIME 9:50 INTERVIEWED BY PW

OWNER OF WELL:

Name:.....Jim Hannivan.....Telephone (Bus.)..454-3962..

Address:..Box 84, Coboconk.....(incl. Area Code) (Home)..454-3346

OCCUPANT OF HOUSE SERVED BY WELL (If other than owner):

Name:....Mrs. Hannivan (owner's mother).....Telephone (Bus.).....

Address: Directly Beside (north) of Texaco Station.....(incl. Area Code) (Home).....

WELL LOCATION: Lot.....Concession.....Township.....

WELL CONSTRUCTION DETAILS:

Date constructed.....Use.....Contractor.....

Type (drilled or dug).....Diameter.....Well Depth.....

Is well accessible for direct sampling.....or buried.....

Well completed into Bedrock.....m. Overburden.....m

Screen: Yes.... No.... If yes, length.....m. Depth to top of screen.....m

WELL WATER LEVELS:

(Indicate whether measured from ground level, or from top of casing)

Original water level depth.....m.

Subsequent water level measurements (give depths in m and dates).....

.....

PUMPING EQUIPMENT:

Pump Type: Suction-lift....or Positive-submergence....Pumping capacity.....Age...

How is your pump lubricated?.....

Depth of intake setting.....m (Original).....m (present) Pumping rate....L/s

Storage tank: Type..... Capacity.....

Do you have a:

Chlorinator.....Water Softener.....Water Filter.....Filter Type.....

Water use: Domestic No...Yes... No. of persons using water from well .....

Livestock No...Yes... No. of livestock watered from well .....

Lawn watering No...Yes... Other..... Amount.....

Equipment: Indoor plumbing (e.g. shower, automatic washer, etc.).....

.....

Private waste and water disposal: Type (septic tank, etc.).....

Distance to well .....

Well is (1) Uphill..... (2) Downhill..... (3) Same Grade .....

(continued on reverse..)

Sample Number H2, Assumed MOE Water Well Record Number 2889

WATER WELL RECONNAISSANCE SURVEY

Sheet___of___

PROJECT NAME Coboconk PROJECT NO 88-237

PERSON INTERVIEWED Mary Spry RESIDENCE X

DATE August 24/88 TIME 12:00 INTERVIEWED BY PW

OWNER OF WELL:

Name: Mary Spry Telephone (Bus.)

Address: (incl. Area Code) (Home) 454-3982

OCCUPANT OF HOUSE SERVED BY WELL (If other than owner):

Name: Mary Spry Telephone (Bus.)

Address: (incl. Area Code) (Home) 454-3982

WELL LOCATION: Lot Part 55 Concession Front Range Township

WELL CONSTRUCTION DETAILS:

Date constructed 20 years Use Domestic Contractor Weaver Well Drilling

Type (drilled or dug) drilled Diameter - Well Depth 60 ft

Is well accessible for direct sampling - or buried -

Well completed into Bedrock Yes m. Overburden m

Screen: Yes.... No.... If yes, length m. Depth to top of screen m

WELL WATER LEVELS:

(Indicate whether measured from ground level, or from top of casing)

Original water level depth - m.

Subsequent water level measurements (give depths in m and dates) -

PUMPING EQUIPMENT:

Pump Type: Suction-lift....or Positive-submergence....Pumping capacity.....Age...

How is your pump lubricated? -

Depth of intake setting.....m (Original).....m (present) Pumping rate....L/s

Storage tank: Type..... Capacity.....

Do you have a:

Chlorinator No...Water Softener Yes....Water Filter No...Filter Type.....

Water use: Domestic No...Yes. X No. of persons using water from well 3

Livestock No. X Yes... No. of livestock watered from well

Lawn watering No...Yes. X Other..... Amount.....

Equipment: Indoor plumbing (e.g. shower, automatic washer, etc.) washer, dishwasher, shower

Private waste and water disposal: Type (septic tank, etc.) Septic

Distance to well 50 ft

Well is (1) Uphill slightly (2) Downhill..... (3) Same Grade .....

(continued on reverse..)

Sample Number H3, Assumed MOE Water Well Record Number 11200

WATER WELL RECONNAISSANCE SURVEY

Sheet___of___

PROJECT NAME Cobocank PROJECT NO 88-237

PERSON INTERVIEWED Mary Spry/Mrs. Mitchell RESIDENCE X

DATE August 24/88 TIME 12:20 INTERVIEWED BY PW

OWNER OF WELL:

Name: Mrs. Mitchell Telephone (Bus.)

Address: (incl. Area Code) (Home)

OCCUPANT OF HOUSE SERVED BY WELL (If other than owner):

Name: Mrs. Mitchell Telephone (Bus.)

Address: (incl. Area Code) (Home)

WELL LOCATION: Lot Part 35 Concession Front Range Township

WELL CONSTRUCTION DETAILS:

Date constructed May 17/88 Use X Contractor Weaver

Type (drilled or dug) drilled Diameter 6 1/4 in Well Depth 92 ft

Is well accessible for direct sampling or buried

Well completed into Bedrock Yes m. Overburden 0-1 ft of topsoil 1-4 ft of clay m

Screen: Yes.... No.... If yes, length m. Depth to top of screen m

WELL WATER LEVELS:

(Indicate whether measured from ground level, or from top of casing) Pumping rate: 20 GPM

Original water level depth 90 ft m. Duration of pumping: 1 hr

Static level: 31 ft

Subsequent water level measurements (give depths in m and dates)

Water level end of pumping: 60 ft

Pump intake set at 85 ft

PUMPING EQUIPMENT: NOTE: clear water, rotary method of construction

Pump Type: Suction-lift or Positive-submergence Pumping capacity Age

How is your pump lubricated?

Depth of intake setting m (Original) m (present) Pumping rate L/s

Storage tank: Type Capacity

Do you have a:

Chlorinator No Water Softener No Water Filter No Filter Type

Water use: Domestic No Yes X. No. of persons using water from well 1

Livestock No X Yes No. of livestock watered from well

Lawn watering No Yes X Other Amount

Equipment: Indoor plumbing (e.g. shower, automatic washer, etc.) shower, washer

Private waste and water disposal: Type (septic tank, etc.) Septic

Distance to well 45 ft

Well is (1) Uphill (2) Downhill slightly (3) Same Grade

(continued on reverse..)

Sample Number H4, Assumed MOE Water Well Record Number - No Number

WATER WELL RECONNAISSANCE SURVEY

Sheet___of___

PROJECT NAME Coboconk PROJECT NO 88-237

PERSON INTERVIEWED Colleen Liscombe RESIDENCE Store

DATE August 24/88 TIME 10:20 INTERVIEWED BY PW

OWNER OF WELL:

Name:.....Pam Wilcox.....Telephone (Bus.) 454-1401

Address:.....The Millworks Store.....(incl. Area Code) (Home) 454-8879

OCCUPANT OF HOUSE SERVED BY WELL (If other than owner):

Name:.....Telephone (Bus.).....

Address:.....(incl. Area Code) (Home).....

WELL LOCATION: Lot.....Concession.....Township.....

WELL CONSTRUCTION DETAILS:

Date constructed.....Use.....Contractor.....

Type (drilled or dug).....Diameter.....Well Depth.....

Is well accessible for direct sampling.....or buried.....

Well completed into Bedrock.....m. Overburden.....m

Screen: Yes.... No.... If yes, length.....m. Depth to top of screen.....m

WELL WATER LEVELS:

(Indicate whether measured from ground level, or from top of casing)

Original water level depth.....m.

Subsequent water level measurements (give depths in m and dates).....

.....

PUMPING EQUIPMENT:

Pump Type: Suction-lift....or Positive-submergence....Pumping capacity.....Age...

How is your pump lubricated?.....

Depth of intake setting.....m (Original).....m (present) Pumping rate....L/s

Storage tank: Type..... Capacity.....

Do you have a:

Chlorinator.....Water Softener.....Water Filter.....Filter Type.....

Water use: Domestic No...Yes... No. of persons using water from well .....

Livestock No...Yes... No. of livestock watered from well .....

Lawn watering No...Yes... Other..... Amount.....

Equipment: Indoor plumbing (e.g. shower, automatic washer, etc.).....

.....

Private waste and water disposal: Type (septic tank, etc.).....

Distance to well .....

Well is (1) Uphill..... (2) Downhill..... (3) Same Grade .....

(continued on reverse..)

Sample Number H5, Assumed MOE Water Well Record Number 5012

WATER WELL RECONNAISSANCE SURVEY

Sheet___of___

PROJECT NAME Coboconk PROJECT NO 88-237

PERSON INTERVIEWED Leslie Frances RESIDENCE X

DATE August 24/88 TIME 10:40 INTERVIEWED BY PW

OWNER OF WELL:

Name: Leslie Frances Telephone (Bus.)

Address: (incl. Area Code) (Home) 454-1262

OCCUPANT OF HOUSE SERVED BY WELL (If other than owner):

Name: Leslie Frances Telephone (Bus.)

Address: (incl. Area Code) (Home)

WELL LOCATION: Lot Part Lot 36 Concession 7 Township

WELL CONSTRUCTION DETAILS:

Date constructed Use Contractor

Type (drilled or dug) Diameter Well Depth

Is well accessible for direct sampling or buried

Well completed into Bedrock m. Overburden m

Screen: Yes.... No.... If yes, length m. Depth to top of screen m

WELL WATER LEVELS:

(Indicate whether measured from ground level, or from top of casing)

Original water level depth m.

Subsequent water level measurements (give depths in m and dates)

PUMPING EQUIPMENT:

Pump Type: Suction-lift....or Positive-submergence....Pumping capacity.....Age...

How is your pump lubricated?

Depth of intake setting m (Original) m (present) Pumping rate L/s

Storage tank: Type Capacity

Do you have a:

Chlorinator Water Softener Water Filter Filter Type

Water use: Domestic No...Yes. X No. of persons using water from well 1

Livestock No. X Yes... No. of livestock watered from well

Lawn watering No. X Yes... Other Amount

Equipment: Indoor plumbing (e.g. shower, automatic washer, etc.). shower

Private waste and water disposal: Type (septic tank, etc.) Septic

Distance to well 37 ft

Well is (1) Uphill (2) Downhill (3) Same Grade X

(continued on reverse..)

Sample Numbers #6 and #9, Assumed MOE Water Well Record Number 6955

WATER WELL RECONNAISSANCE SURVEY

Sheet ___ of ___

PROJECT NAME Coboconk PROJECT NO 88-237

PERSON INTERVIEWED Gayle Webster RESIDENCE X

DATE August 24/88 TIME 1:30 INTERVIEWED BY PW

OWNER OF WELL:

Name: Earl Hughes Telephone (Bus.)

Address: (incl. Area Code) (Home) (705) 454-3944

OCCUPANT OF HOUSE SERVED BY WELL (If other than owner):

Name: Earl Hughes Telephone (Bus.)

Address: (incl. Area Code) (Home)

WELL LOCATION: Lot Concession Township

WELL CONSTRUCTION DETAILS:

Date constructed 14 years Use Contractor Lenridge Well Drilling

Type (drilled or dug) drilled Diameter Well Depth 100 ft

Is well accessible for direct sampling. concrete cover or buried

Well completed into Bedrock Yes m. Overburden m

Screen: Yes.... No.... If yes, length m. Depth to top of screen m

WELL WATER LEVELS:

(Indicate whether measured from ground level, or from top of casing)

Original water level depth m.

Subsequent water level measurements (give depths in m and dates)

PUMPING EQUIPMENT:

Pump Type: Suction-lift....or Positive-submergence X Pumping capacity Age

How is your pump lubricated?

Depth of intake setting m (Original) m (present) Pumping rate L/s

Storage tank: Type Capacity

Do you have a:

Chlorinator No Water Softener X Water Filter X Filter Type

Water use: Domestic No...Yes X No. of persons using water from well 2

Livestock No X Yes... No. of livestock watered from well

Lawn watering No...Yes X Other Amount

Equipment: Indoor plumbing (e.g. shower, automatic washer, etc.)

Private waste and water disposal: Type (septic tank, etc.) Septic

Distance to well 45 ft

Well is (1) Uphill (2) Downhill (3) Same Grade X

(continued on reverse..)

Sample Number H7, Assumed MOE Water Well Record Number 5011

WATER WELL RECONNAISSANCE SURVEY

Sheet___of___

PROJECT NAME Coboconk PROJECT NO 88-237

PERSON INTERVIEWED Wilma Baker RESIDENCE X

DATE August 24/88 TIME 11:10 INTERVIEWED BY PW

OWNER OF WELL:

Name: Ray & Wilma Baker Telephone (Bus.)

Address: (incl. Area Code) (Home) 454-1263

OCCUPANT OF HOUSE SERVED BY WELL (If other than owner):

Name: Ray & Wilma Baker Telephone (Bus.)

Address: (incl. Area Code) (Home)

WELL LOCATION: Lot Part 36 Concession 7 Township

WELL CONSTRUCTION DETAILS:

Date constructed 14 years Use Contractor Gordy Weaver

Type (drilled or dug) drilled Diameter Well Depth 57 ft

Is well accessible for direct sampling concrete covered or buried

Well completed into Bedrock Yes m. Overburden m

Screen: Yes.... No.... If yes, length m. Depth to top of screen m

WELL WATER LEVELS:

(Indicate whether measured from ground level, or from top of casing)

Original water level depth m.

Subsequent water level measurements (give depths in m and dates)

PUMPING EQUIPMENT:

Pump Type: Suction-lift....or Positive-submergence....Pumping capacity.....Age 2 months

How is your pump lubricated?

Depth of intake setting m (Original) m (present) Pumping rate L/s

Storage tank: Type Capacity

Do you have a:

Chlorinator No Water Softener No Water Filter X Filter Type Clear 'n' Fresh Envirogard Products Ltd.

Water use: Domestic No...Yes X No. of persons using water from well 3

Livestock No X Yes... No. of livestock watered from well

Lawn watering No. X Yes... Other Amount

Equipment: Indoor plumbing (e.g. shower, automatic washer, etc.) shower

Private waste and water disposal: Type (septic tank, etc.) Septic

Distance to well 52 ft.

Well is (1) Uphill (2) Downhill (3) Same Grade X

(continued on reverse)

Sample Number H8, Assumed MOE Water Well Record Number 8778

WATER WELL RECONNAISSANCE SURVEY

Sheet___of___

PROJECT NAME Coboconk PROJECT NO 88-237

PERSON INTERVIEWED John Wilms RESIDENCE X

DATE August 24/88 TIME 11:30 INTERVIEWED BY PW

OWNER OF WELL:

Name: John Wilms Telephone (Bus.)

Address: (incl. Area Code) (Home) 454-8112

OCCUPANT OF HOUSE SERVED BY WELL (if other than owner):

Name: John Wilms Telephone (Bus.)

Address: (incl. Area Code) (Home)

WELL LOCATION: Lot Part 36 Concession 7 Township

WELL CONSTRUCTION DETAILS:

Date constructed 8 years Use X Contractor Gordy Weaver

Type (drilled or dug) drilled Diameter 6-8 inch Well Depth 48 ft

Is well accessible for direct sampling No or buried

Well completed into Bedrock Yes m. Overburden m

Screen: Yes.... No.... If yes, length m. Depth to top of screen m

WELL WATER LEVELS:

(Indicate whether measured from ground level, or from top of casing)

Original water level depth 15 ft from ground surface when drilled m.

Subsequent water level measurements (give depths in m and dates) No

PUMPING EQUIPMENT:

Pump Type: Suction-lift....or Positive-submergence....Pumping capacity.....Age 8 years

How is your pump lubricated? sealed bearings

Depth of intake setting m (Original) m (present) Pumping rate L/s

Storage tank: Type No Capacity

Do you have a:

Chlorinator No Water Softener No Water Filter No Filter Type

Water use: Domestic No...Yes X. No. of persons using water from well 5

Livestock No...Yes X. No. of livestock watered from well 1

Lawn watering No X Yes... Other Amount

Equipment: Indoor plumbing (e.g. shower, automatic washer, etc.) washer, bathtub-no shower, dishwasher

Private waste and water disposal: Type (septic tank, etc.) Septic

Distance to well 44 ft

Well is (1) Uphill (2) Downhill (3) Same Grade X

APPENDIX III

- BOREHOLE LOGS
- HAND AUGER BOREHOLE LOGS
- MONITOR DETAILS SUMMARY
- SLUG TEST ANALYSIS PLOTS

BOREHOLE LOG	PROJECT NO. 88-237	BOREHOLE NO. 1
PROJECT NAME Coboconk Waste Disposal Site Coboconk, Ontario		DATE 17 August 1988 GEOLOGIST PW
CLIENT Ministry of the Environment		ELEVATION 280.79 masl

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER I II	INTERVAL	SAMPLE NO.	TYPE	N VALUE	%RECOVERY	%WATER	%RQD	Penetration Resistance N VALUE (Blows/0.3m) 10 20 30 40	Water Content (%) w 10 20 30
		LIMESTONE (Gull River Formation) Grey-Brown, fractured with sand, shale and clay seams			1	NQ		80		4		
1												
2.1 2		Grey, fractured with clay seams and horizontal shaley partings, some vertical fractures with well developed crystals on fracture faces, fine to medium grained, laminated, fossiliferous										
3					2	NQ		90		0		
4					3	NQ		90		0		
					4	NQ		100		53		
5												
6					5	NQ		100		48		
7												
8					6	NQ		100		60		
9					7	NQ		100		86		
10												
10.7		NQ corehole terminated at 10.7 m in fractured limestone.										

P-Piezometer S-Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG

PROJECT NO. 88-237		BOREHOLE NO. 2
PROJECT NAME Coboconk Waste Disposal Site, Coboconk, Ontario		DATE 18 August 1988
		GEOLOGIST PW
CLIENT Ministry of the Environment		ELEVATION 276.98 masl

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER I II	SAMPLE INTERVAL	NO.	TYPE	N VALUE	%RECOVERY	%WATER	%RQD	Penetration Resistance N VALUE (Blows/0.3m) 10 20 30 40	Water Content (%) w_c 10 20 30
		LIMESTONE (Gull River Formation) Grey, fractured with shaley parting and vuggy sections, fine to medium grained, laminated, fossiliferous			1	NQ		100		19		
1					2	NQ		100		31		
2					3	NQ		100		50		
3					4	NQ		100		75		
4												
5					5	NQ		100		80		
6					6	NQ		100		88		
7												
8					7	NQ		100		79		
9.1 9												
		NQ Corehole terminated at 9.1 m in fractured limestone.										

P-Piezometer S-Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG

PROJECT NO. 88-237	BOREHOLE NO. 3	
PROJECT NAME Coboconk Waste Disposal Site, Coboconk, Ontario	DATE 18 August 1988	
	GEOLOGIST PW	
CLIENT Ministry of the Environment	ELEVATION 276.94 masl	

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER I II	SAMPLE INTERVAL	NO.	TYPE	N VALUE	%RECOVERY	%WATER	%RQD	Penetration Resistance N VALUE (Blows/0.3m) 10 20 30 40	Water Content (%) w 10 20 30
0.3		**SANDY SILT TOPSOIL**										
		LIMESTONE (Gull River Formation) Grey, fractured with shaley partings and mud seams, fine to medium grained, laminated, fossiliferous			1	NQ		95		0		
					2	NQ		90		0		
1												
2					3	NQ		80		47		
3					4	NQ		100		48		
4												
5					5	NQ		100		71		
6					6	NQ		100		74		
7												
8					7	NQ		100		80		
9.1 9		NQ Corehole terminated at 9.1 m in fractured limestone.										

P-Piezometer S-Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG

PROJECT NO. 88-237	BOREHOLE NO. 4	
PROJECT NAME Coboconk Waste Disposal Site, Coboconk, Ontario	DATE 19 August 1988	
	GEOLOGIST PW	
CLIENT Ministry of the Environment	ELEVATION 280.30 masl	

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE INTERVAL	NO.	TYPE	N VALUE	%RECOVERY	%WATER	%RQD	Penetration Resistance N VALUE (Blows/0.3m) 10 20 30 40	Water Content (%) w 10 20 30
0.2		**ORGANIC/SANDY TOPSOIL**										
1		**FILL** Tan-Brown to Brown, sand, gravel, silt, glass, rubble, garbage										
2												
3					1	SS	60				>50	
3.5		**LIMESTONE** (Gull River Formation) Grey, fractured with shaley partings and vuggy sections, fine to medium grained, laminated, fossiliferous			2	NQ		90		54		
4												
5					3	NQ		100		56		
6					4	NQ		100		67		
7												
8					5	NQ		100		74		
9.1 9		NQ Corehole terminated at 9.1 m in fractured limestone.										

P-Piezometer S-Standpipe G-Gas Monitor

Gartner Lee Limited

TABLE 1: HAND AUGER HOLES
Coboconk Waste Disposal Site (88-237)

AH-1

0 - 0.15m	Dark brown, clayey silt till with organic matter Gas reading = 0

AH-2

0 - 0.25m	Brown, silty sand fill (roots, refuse - glass)
0.25 - 0.41m	Brown, sandy silt/silty sand fill (refuse - glass, brick) Gas reading = 0

AH-3

0 - 0.15m	Brown, silty sand fill
0.15 - 0.25m	Brown, sandy silt fill (refuse - glass) Gas reading = 0

AH-4

0 - 0.25m	Silty sand fill (refuse - burnt garbage and glass)
0.25 - 0.30m	Tan-brown, fine to medium sand Gas reading = 0

AH-5

0 - 0.30m	Brown, silty sand (refuse - glass) Gas reading = 0

AH-6

0 - 0.15m	Black, organic, sandy topsoil Gas reading = 0

PROJECT NO: 88-237

MONITOR DETAILS SUMMARY

BOREHOLE		MONITOR					SCREENED INTERVAL		FILTER PACK		SEAL		BACKFILL	
NO.	DIAMETER (mm)	NO.	TYPE	DIAMETER (mm)	STICK-UP (m)	ELEVATION (t.o.p.m.)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)
1	76	I	PVC	51	0.32	281.114	9.8 -	8.3	9.8 -	8.0	8.0 -	7.4	7.4 -	0
1	76	II	PVC	51	0.04	280.916	6.1 -	3.1	6.1 -	3.0	3.0 -	2.4	2.4 -	0
2	76	I	PVC	51	0.22	277.194	9.0 -	7.5	9.0 -	7.0	7.0 -	6.4	6.4 -	0
2	76	II	PVC	51	0.08	277.087	4.6 -	1.6	4.6 -	1.0	1.0 -	0.4	0.4 -	0
3	76	I	PVC	51	0.37	277.305	8.7 -	7.2	8.7 -	7.0	7.0 -	6.4	6.4 -	0
3	76	II	PVC	51	0.31	277.315	4.3 -	1.3	4.3 -	1.0	1.0 -	0.4	0.4 -	0
4	76	I	PVC	51	0.09	280.388	8.8 -	5.8	8.8 -	5.5	5.5 -	4.9	4.9 -	0

NOTE: t.o.p.m. - TOP OF PIPE IN METRES

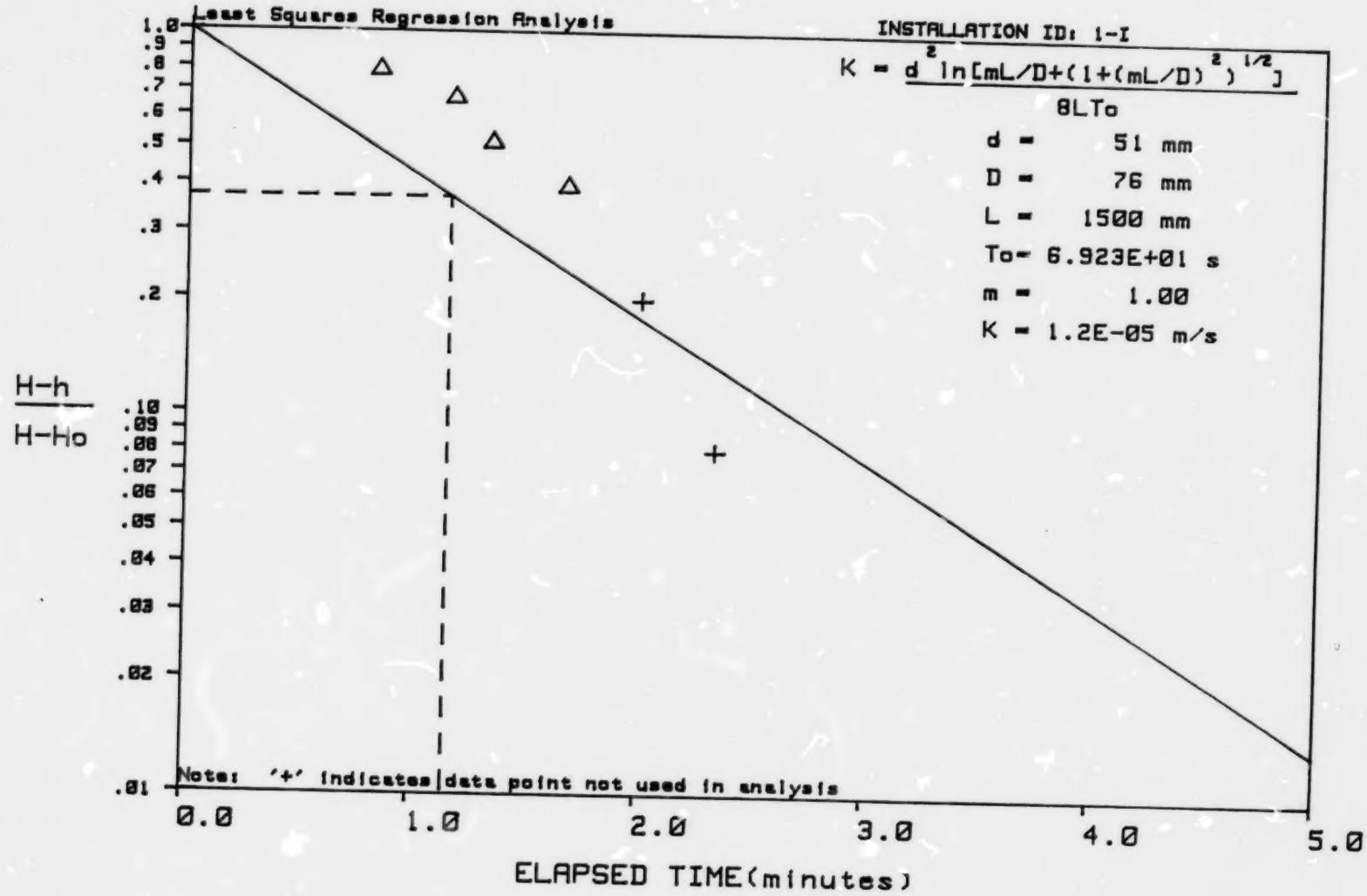
PROJECT NO: 88-237 COBOCONK LANDFILL

WATER LEVEL DATA

B.H. NO.	GROUND ELEV.	MONITOR NO.	TOP OF MONITOR ELEV.	TYPE	18-AUG-88 DEPTH BELOW T.O.P. (m)	18-AUG-88 ELEV. (m)	19-AUG-88 DEPTH BELOW T.O.P. (m)	19-AUG-88 ELEV. (m)	23-AUG-88 DEPTH BELOW T.O.P. (m)	23-AUG-88 ELEV. (m)	24-AUG-88 DEPTH BELOW T.O.P. (m)	24-AUG-88 ELEV. (m)	25-AUG-88 DEPTH BELOW T.O.P. (m)	25-AUG-88 ELEV. (m)	11-NOV-88 DEPTH BELOW T.O.P. (m)	11-NOV-88 ELEV. (m)
1	280.79	I	281.11	P	2.41	278.70	2.46	278.65	2.65	278.46	2.75	278.36	2.57	278.54	1.74	279.37
1	280.87	II	280.92	S	1.99	278.93	2.15	278.77	2.33	278.59	2.31	278.61	2.22	278.70	1.43	279.49
2	276.98	I	277.19	P	-	-	3.86	273.33	-	-	5.10	272.09	5.12	272.07	0.29	276.90
2	277.00	II	277.09	S	4.14	272.95	4.09	273.00	4.20	272.89	4.24	272.85	4.24	272.85	0.13	276.96
3	276.94	I	277.31	P	-	-	-	-	5.68	271.63	6.21	271.10	6.28	271.03	0.78	276.53
3	277.01	II	277.32	S	-	-	3.48	273.84	-	-	DRY	-	DRY	-	0.71	276.61
4	280.30	I	280.39	P	-	-	-	-	6.49	273.90	6.97	273.42	6.96	273.43	3.34	277.05

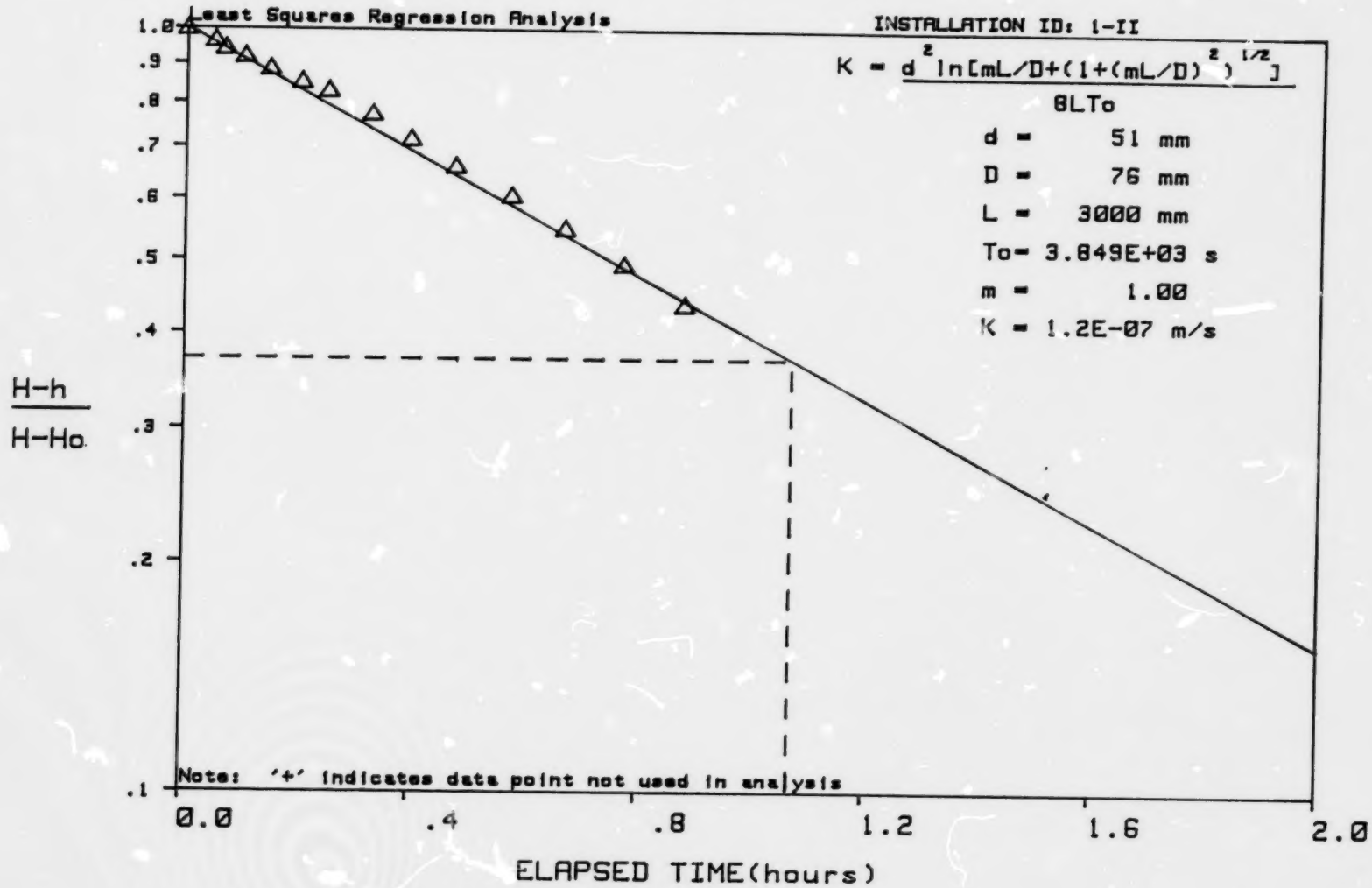
NOTE: S - STANDPIPE
P - PIEZOMETER
T.O.P. - TOP OF PIPE

SLUG TEST ANALYSIS - HVORSLEV'S METHOD



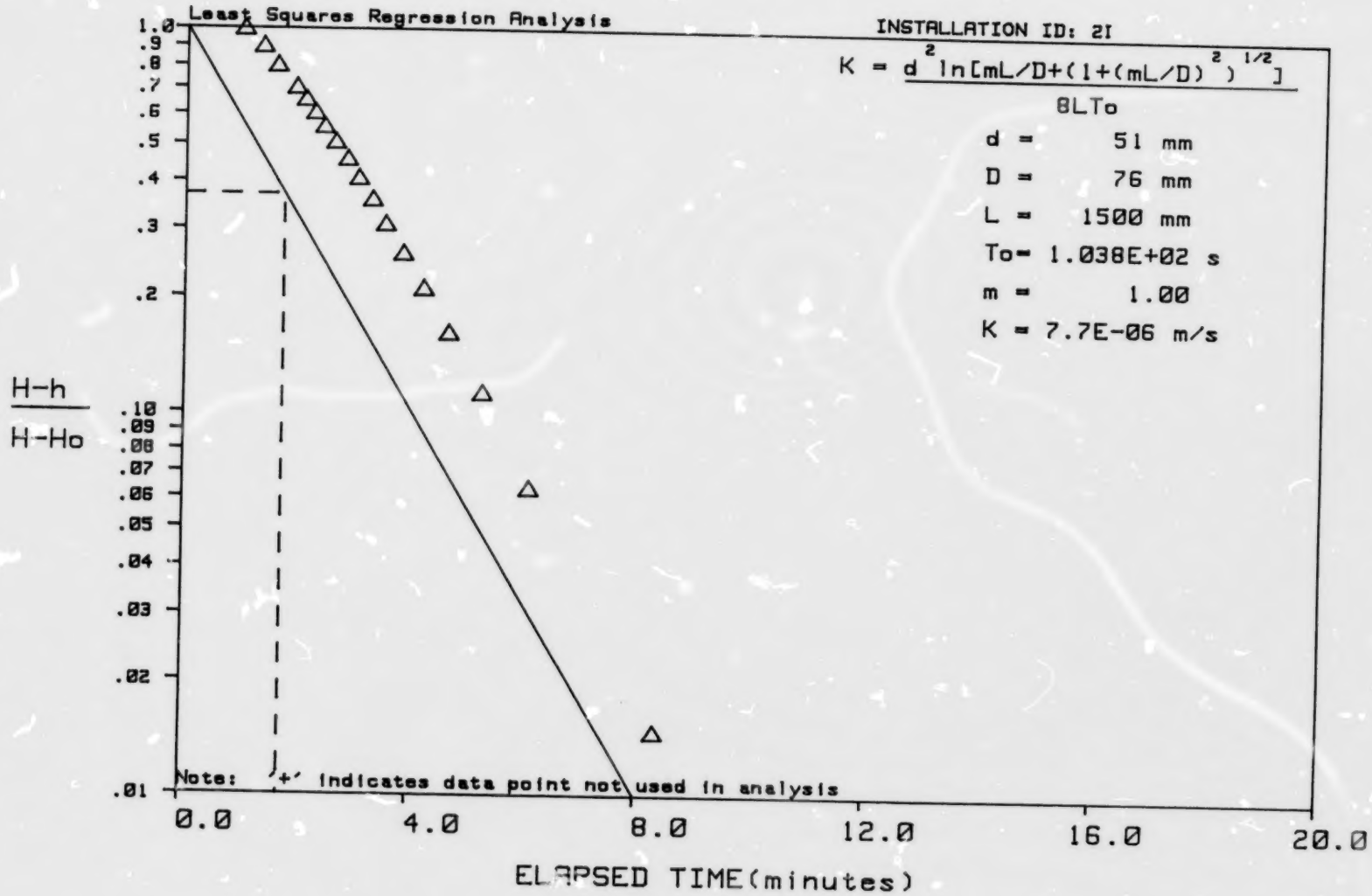
PROJECT NAME: COBOCONK PROJECT NUMBER: 88-237

SLUG TEST ANALYSIS - HVORSLEV'S METHOD



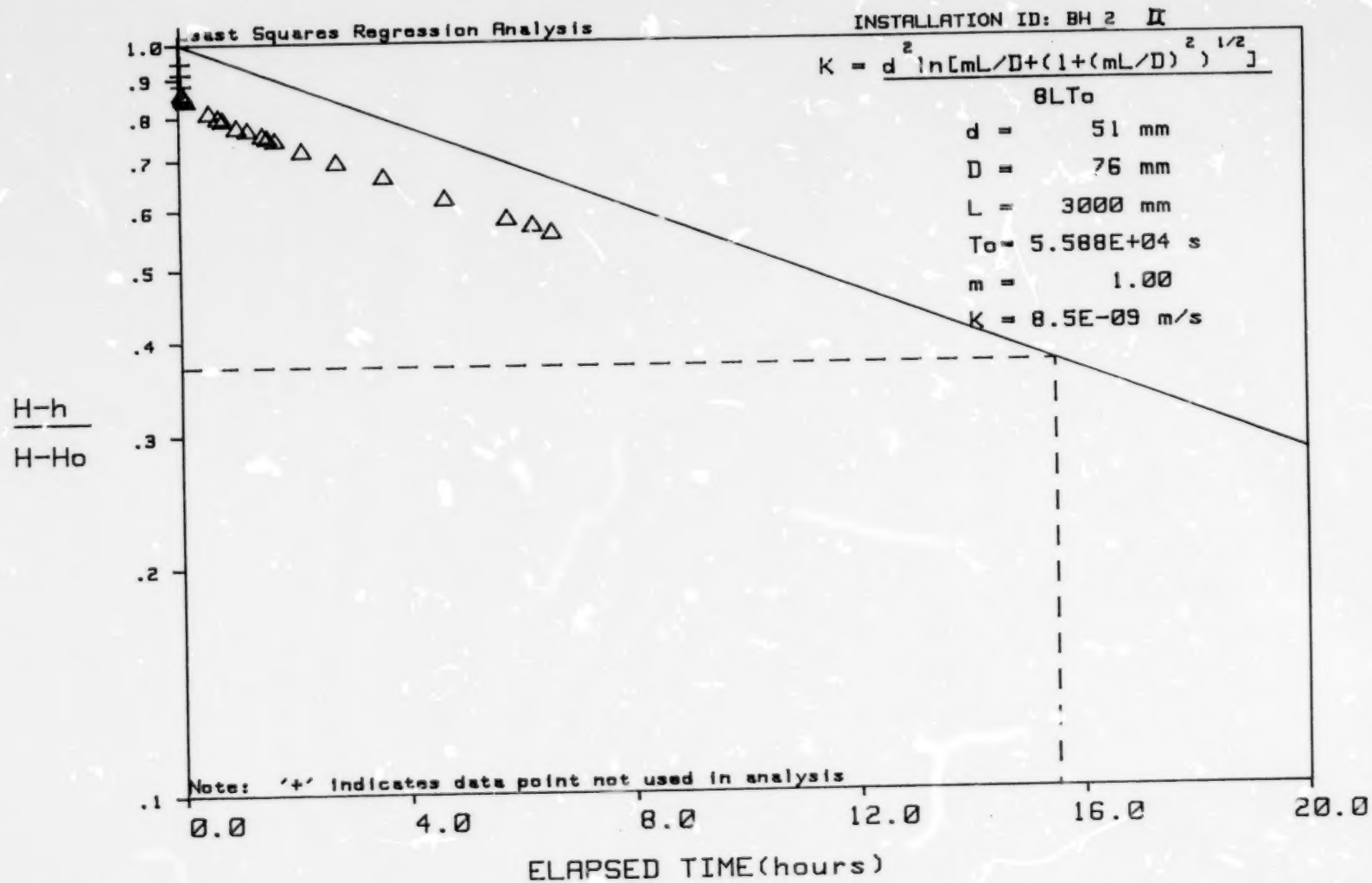
PROJECT NAME: COBOCONK PROJECT NUMBER: 88-237

SLUG TEST ANALYSIS - HVORSLEV'S METHOD



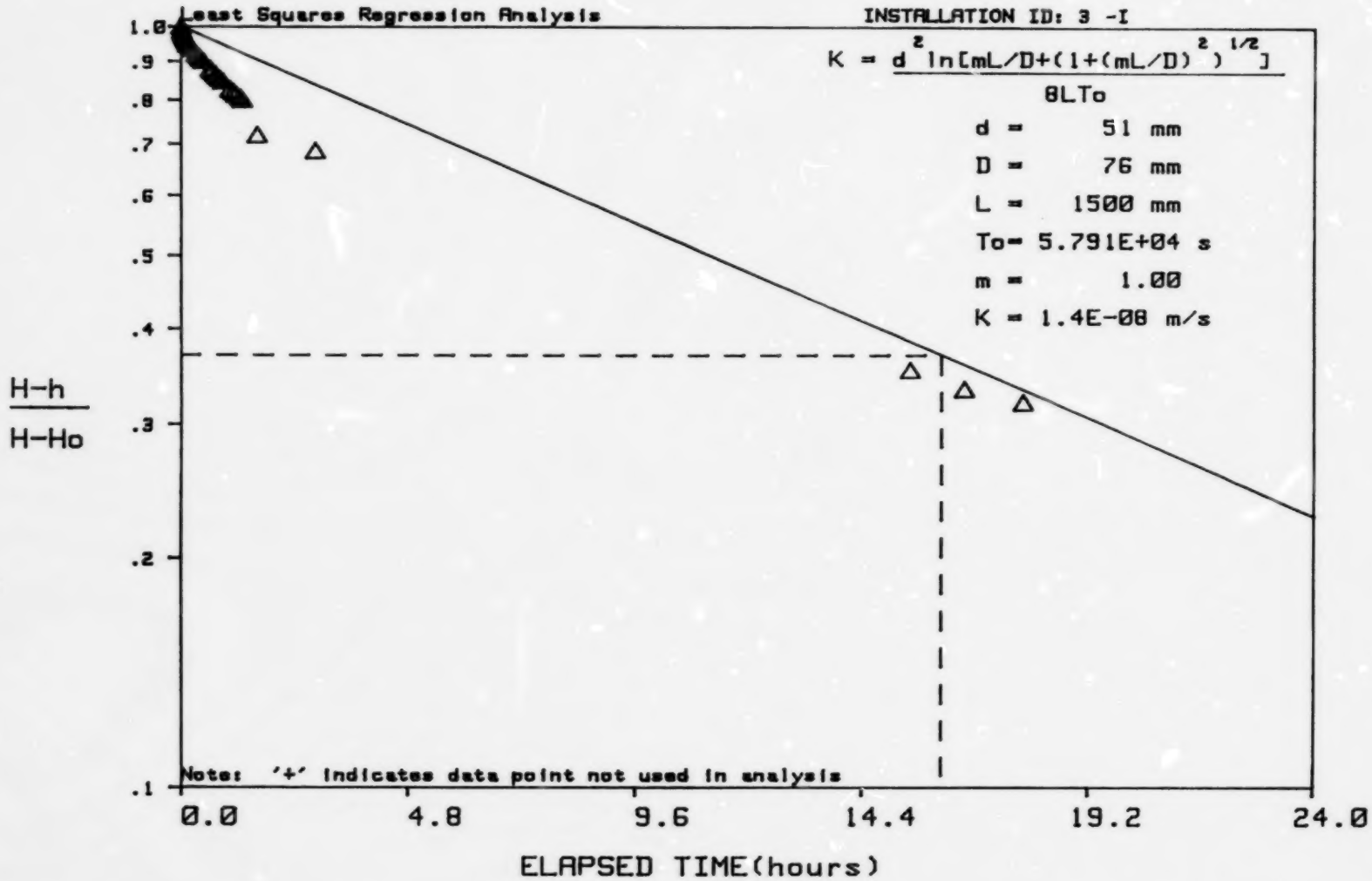
PROJECT NAME: COBOCONK LANDFILL SITE PROJECT NUMBER: 87-237

SLUG TEST ANALYSIS - HVORSLEV'S METHOD



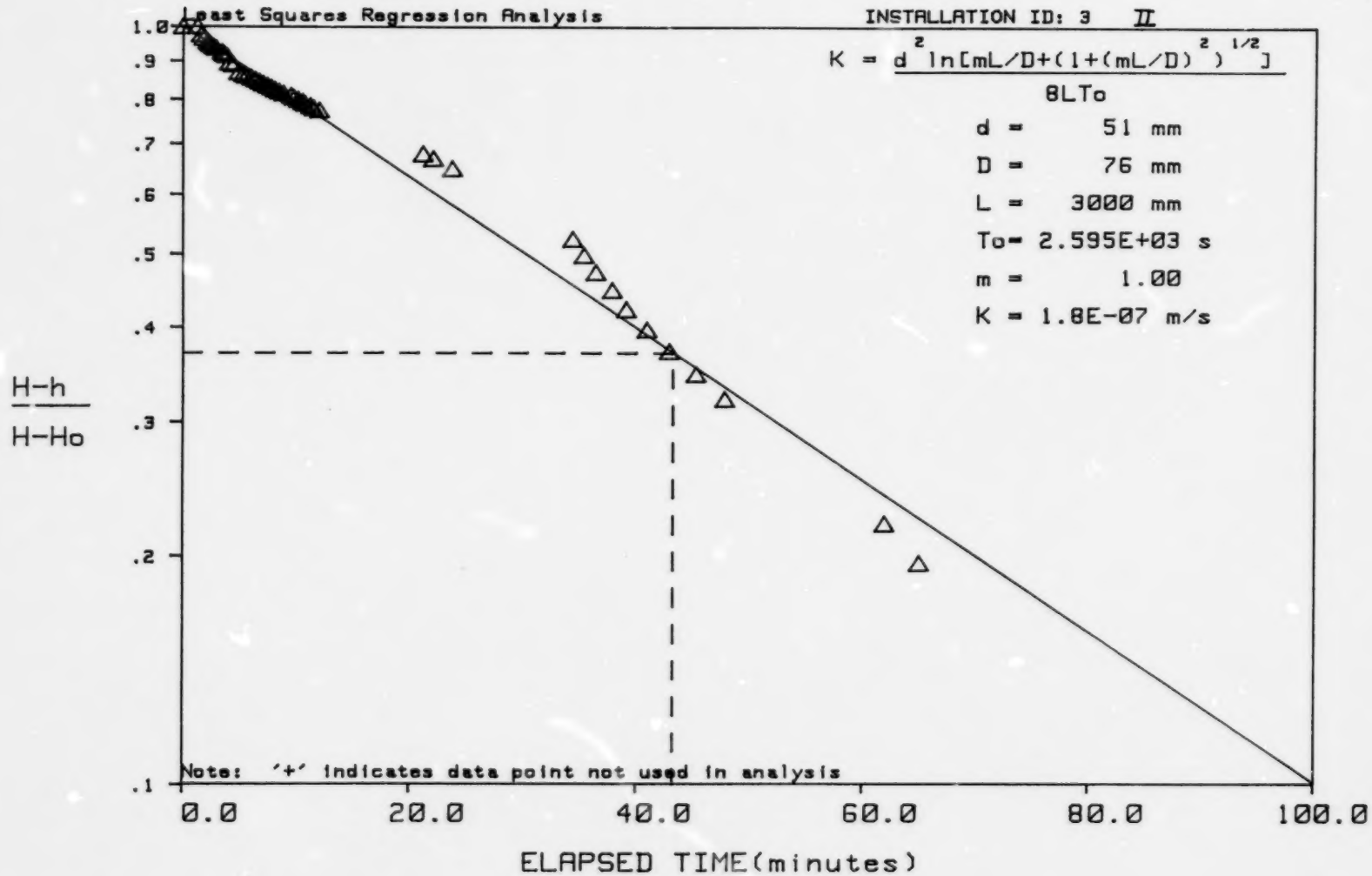
PROJECT NAME: COBOCONK PROJECT NUMBER: 88237

SLUG TEST ANALYSIS - HVORSLEV'S METHOD



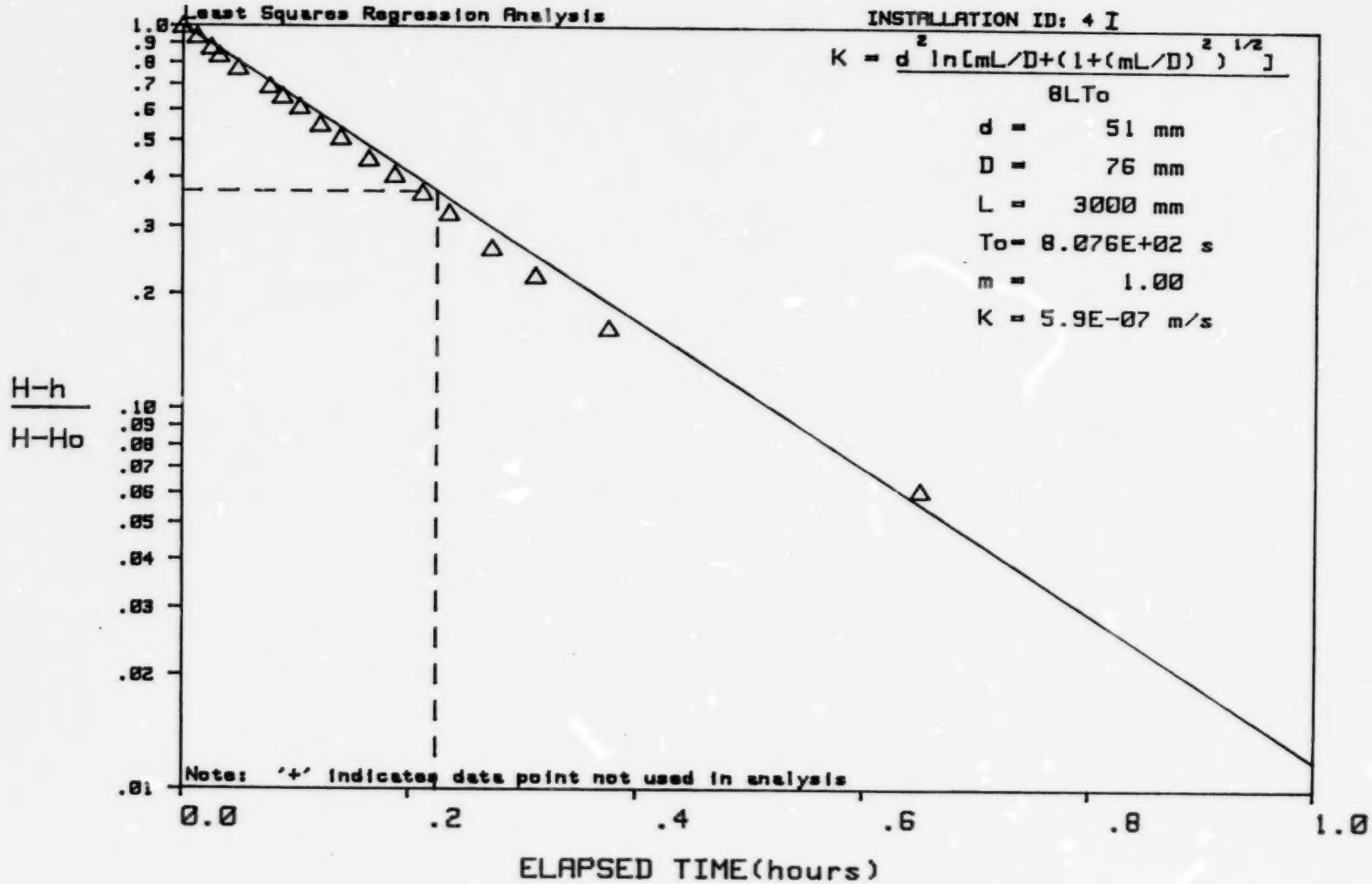
PROJECT NAME: COBOCONK PROJECT NUMBER: 88-237

SLUG TEST ANALYSIS - HVORSLEV'S METHOD



PROJECT NAME: COBOCONK LANDFILL SITE PROJECT NUMBER: 88237

SLUG TEST ANALYSIS - HVORSLEV'S METHOD



PROJECT NAME: COBOCONK PROJECT NUMBER: 88-237

APPENDIX IV

- ROUTINE WATER CHEMISTRY ANALYSIS - AUGUST SAMPLES
- ROUTINE WATER CHEMISTRY ANALYSES - NOVEMBER SAMPLES
- VOLATILE ORGANIC ANALYSES OF LEACHATE (MONITOR 4-I)
- HEAVY METAL ANALYSES OF LEACHATE (MONITOR 4-I)

MANN TESTING LABORATORIES LTD.
5550 McADAM ROAD, MISSISSAUGA, ONTARIO L4Z 1P1
PHONE: 890-2555 • TELEX: 06-960496 • FAX: (416) 890-0370

RECEIVED OCT 18 1988 GARTNER LEE

CUSTOMER: Gartner Lee Limited
140 Renfrew Drive
Markham, Ontario
L3R 6B3

REPORT #: 882315

CUSTOMER REF.# 88-237

ATTN: Mr. Rob Dickin

DATE SUBMITTED: Aug. 25, 1988

---------- CERTIFICATE OF ANALYSIS ----------

Sample Description: WATER

Preparation: Samples were prepared as recommended in APHA Standard methods for the examination of water and wastewater, 16th Edition, 1985 or MOE Handbook of analytical methods for environmental samples, 1983.

Note: Additional information is available on request.

Methodology:

Metals - flame, atomic absorption, Inductivity coupled Plasma Atomic Emission.

Conventionals - potentiometric, spectrophotometric and other wet chemical techniques.

Chemical Results: See Tables 1 and 2.

DATE: Oct. 6/88

CERTIFIED BY:
Jim Forrester,
Manager, Inorganic Dept.

Members: Association of Official Racing Chemists, American Chemical Society, Canadian Society of Forensic Science, Chemical Institute of Canada, American Society for Testing and Materials, Canadian Federation of Independent Business, Better Business Bureau, Association of the Chemical Profession of Ontario, Association of Professional Engineers of the Province of Ontario, Canadian Association of Fire Chiefs, American Industrial Hygiene Association, Air Pollution Control Association, Canadian Society of Safety Engineering, International Society for Respiratory Protection

REPORT TO: GARTNER LEE LIMITED
PROJECT #:88-237
LAB.#:882315
TABLE #1A

RCAp CHEMICAL PARAMETERS	METHOD DETECTION LIMIT	#H1 Water Soluble	#H1 'Total' Metals	#H2 Water Soluble	#H2 'Total' Metals
Sodium	0.5 mg/L	120		7.3	
Potassium	0.1 mg/L	5.0		1.9	
Calcium	0.005 mg/L	138		88	
Magnesium	0.001 mg/L	24		11	
Hardness (as $CaCO_3$)	0.05 mg/L	443		265	
Alkalinity (as $CaCO_3$)	1.0 mg/L	210		240	
Sulphate	1.0 mg/L	400		33	
Chloride	1.0 mg/L	54		8	
Silica	0.5 mg/L	10		6.1	
o-Phosphate (as P)	0.01 mg/L	<0.01		<0.01	
Nitrate + Nitrite (as N)	0.05 mg/L	<0.05		0.13	
Ammonia (as N)	0.05 mg/L	0.35		<0.05	
Iron	0.02 mg/L	0.23	0.31	0.02	0.05
Manganese	0.01 mg/L	0.04	0.05	<0.01	0.01
Copper	0.01 mg/L	<0.01	<0.01	0.11	0.11
Zinc	0.01 mg/L	0.27	0.30	0.01	0.01
Colour (true)	0.5 T.C.U.	6		6	
Turbidity	0.1 N.T.U.	2.5		0.6	
Conductivity (25°C)	0.1 umho/cm	1480		593	
pH	0.01	7.6		7.5	
Total Organic Carbon	0.5 mg/L	1.7		2.6	
Cation Sum	0.01 meq/L	14.27		5.68	
Anion Sum	0.01 meq/L	14.05		5.72	
Ion Ratio	0.01	1.02		0.99	
% Difference	0.1 %	0.8		0.4	
TDS (ion sum, calc)	0.1 mg/L	877		300	
Conductivity (calc, 25°C)	0.1 umho/cm	1632		568	
Saturation pH (4°C)	0.01	7.34		7.43	
Langelier Index (4°C)	0.01	0.26		0.07	
Bicarbonate (as $CaCO_3$)	1.0 mg/L	209		239	
Carbonate (as $CaCO_3$)	1.0 mg/L	0.8		0.7	

NOTE: ALL RESULTS BASED ON SAMPLE CENTRIFUGED AT 2000 RPM FOR 30 MINUTES EXCEPT pH, TURBIDITY, CONDUCTIVITY AND `TOTAL METALS' (IRON, MANGANESE, COPPER AND ZINC)

ALL RESULTS BASED ON UNPRESERVED SAMPLE AS SUBMITTED EXCEPT FOR IRON, MANGANESE, COPPER AND ZINC (NITRIC ACID TO pH <2).

REPORT TO: GARTNER LEE LIMITED
PROJECT #:88-237
LAB.#:882315
TABLE #1B

RCAp CHEMICAL PARAMETERS	METHOD DETECTION LIMIT	#H3 Water Soluble	#H3 'Total' Metals	#H4 Water Soluble	#H4 'Total' Metals
Sodium	0.5 mg/L	84		58	
Potassium	0.1 mg/L	3.4		1.9	
Calcium	0.005 mg/L	129		134	
Magnesium	0.001 mg/L	13		8.3	
Hardness (as $CaCO_3$)	0.05 mg/L	376		369	
Alkalinity (as $CaCO_3$)	1.0 mg/L	280		230	
Sulphate	1.0 mg/L	49		140	
Chloride	1.0 mg/L	140		95	
Silica	0.5 mg/L	7.1		5.2	
o-Phosphate (as P)	0.01 mg/L	0.01		<0.01	
Nitrate + Nitrite (as N)	0.05 mg/L	2.9		2.2	
Ammonia (as N)	0.05 mg/L	<0.05		<0.05	
Iron	0.02 mg/L	0.08	0.19	0.01	0.03
Manganese	0.01 mg/L	0.15	0.16	0.02	0.01
Copper	0.01 mg/L	0.01	0.01	0.88	0.91
Zinc	0.01 mg/L	1.1	1.1	0.41	0.40
Colour (true)	0.5 T.C.U.	<3		6	
Turbidity	0.1 N.T.U.	1.1		0.5	
Conductivity (25°C)	0.1 umho/cm	1240		1128	
pH	0.01	7.4		7.5	
Total Organic Carbon	0.5 mg/L	3.9		2.8	
Cation Sum	0.01 meq/L	11.27		9.96	
Anion Sum	0.01 meq/L	10.77		10.35	
Ion Ratio	0.01	1.05		0.96	
% Difference	0.1 %	2.3		1.9	
TDS (ion sum, calc)	0.1 mg/L	606		590	
Conductivity (calc, 25°C)	0.1 umho/cm	1205		1138	
Saturation pH (4°C)	0.01	7.23		7.29	
Langelier Index (4°C)	0.01	0.17		0.21	
Bicarbonate (as $CaCO_3$)	1.0 mg/L	279		229	
Carbonate (as $CaCO_3$)	1.0 mg/L	0.7		0.7	

NOTE: ALL RESULTS BASED ON SAMPLE CENTRIFUGED AT 2000 RPM FOR 30 MINUTES EXCEPT pH, TURBIDITY, CONDUCTIVITY AND 'TOTAL METALS' (IRON, MANGANESE, COPPER AND ZINC)

ALL RESULTS BASED ON UNPRESERVED SAMPLE AS SUBMITTED EXCEPT FOR IRON, MANGANESE, COPPER AND ZINC (NITRIC ACID TO pH <2).

REPORT TO: GARTNER LEE LIMITED
PROJECT #:88-237
LAB.#:882315
TABLE #1C

RCAp CHEMICAL PARAMETERS	METHOD DETECTION LIMIT	#H5 Water Soluble	#H5 'Total' Metals	#H6 Water Soluble	#H6 'Total' Metals
Sodium	0.5 mg/L	14		170	
Potassium	0.1 mg/L	4.1		3.7	
Calcium	0.005 mg/L	94		200	
Magnesium	0.001 mg/L	20		9.8	
Hardness (as $CaCO_3$)	0.05 mg/L	317		540	
Alkalinity (as $CaCO_3$)	1.0 mg/L	250		350	
Sulphate	1.0 mg/L	67		35	
Chloride	1.0 mg/L	22		360	
Silica	0.5 mg/L	7.9		6.2	
o-Phosphate (as P)	0.01 mg/L	<0.01		0.04	
Nitrate + Nitrite (as N)	0.05 mg/L	0.17		0.69	
Ammonia (as N)	0.05 mg/L	0.19		0.93	
Iron	0.02 mg/L	0.10	0.36	0.09	0.64
Manganese	0.01 mg/L	0.04	0.05	0.35	0.46
Copper	0.01 mg/L	0.28	0.29	0.15	0.17
Zinc	0.01 mg/L	1.1	1.10	0.03	0.03
Colour (true)	0.5 T.C.U.	11		12	
Turbidity	0.1 N.T.U.	4.4		3.1	
Conductivity (25°C)	0.1 umho/cm	760		1960	
pH	0.01	7.5		7.2	
Total Organic Carbon	0.5 mg/L	4.1		4.5	
Cation Sum	0.01 meq/L	7.09		18.37	
Anion Sum	0.01 meq/L	7.03		17.92	
Ion Ratio	0.01	1.01		1.03	
% Difference	0.1 %	0.4		1.2	
TDS (ion sum, calc)	0.1 mg/L	380		999	
Conductivity (calc, 25°C)	0.1 umho/cm	729		2064	
Saturation pH (4°C)	0.01	7.39		6.97	
Langelier Index (4°C)	0.01	0.11		0.23	
Bicarbonate (as $CaCO_3$)	1.0 mg/L	249		350	
Carbonate (as $CaCO_3$)	1.0 mg/L	0.7		0.5	

NOTE: ALL RESULTS BASED ON SAMPLE CENTRIFUGED AT 2000 RPM FOR 30 MINUTES EXCEPT pH, TURBIDITY, CONDUCTIVITY AND `TOTAL METALS' (IRON, MANGANESE, COPPER AND ZINC)

ALL RESULTS BASED ON UNPRESERVED SAMPLE AS SUBMITTED EXCEPT FOR IRON, MANGANESE, COPPER AND ZINC (NITRIC ACID TO pH <2).

REPORT TO: GARTNER LEE LIMITED
PROJECT #:88-237
LAB.#:882315
TABLE #1D

RCAp CHEMICAL PARAMETERS	METHOD DETECTION LIMIT	#H7 Water Soluble	#H7 'Total' Metals	#H8 Water Soluble	#H8 'Total' Metals
Sodium	0.5 mg/L	22		16	
Potassium	0.1 mg/L	3.0		2.4	
Calcium	0.005 mg/L	112		111	
Magnesium	0.001 mg/L	13		6.6	
Hardness (as $CaCO_3$)	0.05 mg/L	333		304	
Alkalinity (as $CaCO_3$)	1.0 mg/L	250		230	
Sulphate	1.0 mg/L	75		65	
Chloride	1.0 mg/L	41		20	
Silica	0.5 mg/L	5.6		5.0	
o-Phosphate (as P)	0.01 mg/L	<0.01		0.02	
Nitrate + Nitrite (as N)	0.05 mg/L	<0.05		5.2	
Ammonia (as N)	0.05 mg/L	0.14		<0.05	
Iron	0.02 mg/L	0.40	1.0	0.02	0.03
Manganese	0.01 mg/L	0.06	0.11	0.02	0.01
Copper	0.01 mg/L	0.01	0.02	0.01	0.01
Zinc	0.01 mg/L	0.60	0.74	0.06	0.06
Colour (true)	0.5 T.C.U.	22		10	
Turbidity	0.1 N.T.U.	3.2		0.6	
Conductivity (25°C)	0.1 umho/cm	770		760	
pH	0.01	7.4		7.6	
Total Organic Carbon	0.5 mg/L	5.9		3.3	
Cation Sum	0.01 meq/L	7.73		6.86	
Anion Sum	0.01 meq/L	7.72		6.89	
Ion Ratio	0.01	1.00		1.00	
% Difference	0.1 %	0.1		0.2	
TDS (ion sum, calc)	0.1 mg/L	422		387	
Conductivity (calc, 25°C)	0.1 umho/cm	816		723	
Saturation pH (4°C)	0.01	7.32		7.36	
Langelier Index (4°C)	0.01	0.08		0.24	
Bicarbonate (as $CaCO_3$)	1.0 mg/L	249		229	
Carbonate (as $CaCO_3$)	1.0 mg/L	0.6		0.9	

NOTE: ALL RESULTS BASED ON SAMPLE CENTRIFUGED AT 2000 RPM FOR 30 MINUTES EXCEPT pH, TURBIDITY, CONDUCTIVITY AND `TOTAL METALS' (IRON, MANGANESE, COPPER AND ZINC)

ALL RESULTS BASED ON UNPRESERVED SAMPLE AS SUBMITTED EXCEPT FOR IRON, MANGANESE, COPPER AND ZINC (NITRIC ACID TO pH <2).

REPORT TO: GARTNER LEE LIMITED
PROJECT #:88-237
LAB.#:882315
TABLE #1E

RCAp CHEMICAL PARAMETERS	METHOD DETECTION LIMIT	#H9 Water Soluble	#H9 'Total' Metals	1-I #BH 1-D Water Soluble	1-I #BH 1-D 'Total' Metals
Sodium	0.5 mg/L	160		0.9	
Potassium	0.1 mg/L	3.7		0.6	
Calcium	0.005 mg/L	197		113	
Magnesium	0.001 mg/L	9.7		3.8	
Hardness (as $CaCO_3$)	0.05 mg/L	532		298	
Alkalinity (as $CaCO_3$)	1.0 mg/L	350		290	
Sulphate	1.0 mg/L	34		15	
Chloride	1.0 mg/L	360		2	
Silica	0.5 mg/L	6.2		4.8	
o-Phosphate (as P)	0.01 mg/L	0.04		<0.01	
Nitrate + Nitrite (as N)	0.05 mg/L	0.73		<0.05	
Ammonia (as N)	0.05 mg/L	0.95		<0.05	
Iron	0.02 mg/L	0.07	0.64	0.07	0.95
Manganese	0.01 mg/L	0.34	0.45	0.06	0.15
Copper	0.01 mg/L	0.16	0.19	<0.01	<0.01
Zinc	0.01 mg/L	0.03	0.03	0.01	0.01
Colour (true)	0.5 T.C.U.	12		10	
Turbidity	0.1 N.T.U.	2.8		180	
Conductivity (25°C)	0.1 umho/cm	1990		625	
pH	0.01	7.3		7.5	
Total Organic Carbon	0.5 mg/L	4.5		4.1	
Cation Sum	0.01 meq/L	17.78		6.02	
Anion Sum	0.01 meq/L	17.90		6.17	
Ion Ratio	0.01	0.99		0.98	
% Difference	0.1 %	0.3		1.2	
TDS (ion sum, calc)	0.1 mg/L	985		314	
Conductivity (calc, 25°C)	0.1 umho/cm	2034		592	
Saturation pH (4°C)	0.01	6.97		7.24	
Langelier Index (4°C)	0.01	0.33		0.26	
Bicarbonate (as $CaCO_3$)	1.0 mg/L	349		289	
Carbonate (as $CaCO_3$)	1.0 mg/L	0.7		0.9	

NOTE: ALL RESULTS BASED ON SAMPLE CENTRIFUGED AT 2000 RPM FOR 30 MINUTES EXCEPT pH, TURBIDITY, CONDUCTIVITY AND `TOTAL METALS' (IRON, MANGANESE, COPPER AND ZINC)

ALL RESULTS BASED ON UNPRESERVED SAMPLE AS SUBMITTED EXCEPT FOR IRON, MANGANESE, COPPER AND ZINC (NITRIC ACID TO pH <2).

REPORT TO: GARTNER LEE LIMITED
PROJECT #:88-237
LAB.#:882315
TABLE #1F

RCAp CHEMICAL PARAMETERS	METHOD DETECTION LIMIT	1-II #BH 1-S Water Soluble	'Total' Metals	2-I #BH 2-D Water Soluble	'Total' Metals
Sodium	0.5 mg/L	0.9		20	
Potassium	0.1 mg/L	3.5		3.7	
Calcium	0.005 mg/L	99		64	
Magnesium	0.001 mg/L	7.8		14	
Hardness (as $CaCO_3$)	0.05 mg/L	279		218	
Alkalinity (as $CaCO_3$)	1.0 mg/L	250		175	
Sulphate	1.0 mg/L	21		70	
Chloride	1.0 mg/L	3		11	
Silica	0.5 mg/L	5.3		4.7	
o-Phosphate (as P)	0.01 mg/L	<0.01		<0.01	
Nitrate + Nitrite (as N)	0.05 mg/L	<0.05		0.86	
Ammonia (as N)	0.05 mg/L	<0.05		0.4	
Iron	0.02 mg/L	0.02	0.23	0.03	0.61
Manganese	0.01 mg/L	0.04	0.05	0.04	0.11
Copper	0.01 mg/L	0.01	0.01	0.01	0.02
Zinc	0.01 mg/L	0.02	0.02	0.01	0.03
Colour (true)	0.5 T.C.U.	11		4	
Turbidity	0.1 N.T.U.	52		100	
Conductivity (25°C)	0.1 umho/cm	575		560	
pH	0.01	7.6		7.7	
Total Organic Carbon	0.5 mg/L	2.9		4.1	
Cation Sum	0.01 meq/L	5.73		5.36	
Anion Sum	0.01 meq/L	5.51		5.33	
Ion Ratio	0.01	1.04		1.01	
% Difference	0.1 %	2.0		0.3	
TDS (ion sum, calc)	0.1 mg/L	290		297	
Conductivity (calc, 25°C)	0.1 umho/cm	552		558	
Saturation pH (4°C)	0.01	7.36		7.70	
Langelier Index (4°C)	0.01	0.24		0.00	
Bicarbonate (as $CaCO_3$)	1.0 mg/L	249		174	
Carbonate (as $CaCO_3$)	1.0 mg/L	0.9		0.8	

NOTE: ALL RESULTS BASED ON SAMPLE CENTRIFUGED AT 2000 RPM FOR 30 MINUTES EXCEPT pH, TURBIDITY, CONDUCTIVITY AND 'TOTAL METALS' (IRON, MANGANESE, COPPER AND ZINC)

ALL RESULTS BASED ON UNPRESERVED SAMPLE AS SUBMITTED EXCEPT FOR IRON, MANGANESE, COPPER AND ZINC (NITRIC ACID TO pH <2).

REPORT TO: GARTNER LEE LIMITED
PROJECT #:88-237
LAB.#:882315
TABLE #1G

3-I

RCAp CHEMICAL PARAMETERS	METHOD DETECTION LIMIT	#BH 3-D Water Soluble	#BH 3-D 'Total' Metals	#BH 4 Water Soluble	#BH 4 'Total' Metals
Sodium	0.5 mg/L	7.6		4	
Potassium	0.1 mg/L	6.3		3.4	
Calcium	0.005 mg/L	86		88	
Magnesium	0.001 mg/L	12		21	
Hardness (as $CaCO_3$)	0.05 mg/L	264		306	
Alkalinity (as $CaCO_3$)	1.0 mg/L	190		280	
Sulphate	1.0 mg/L	70		26	
Chloride	1.0 mg/L	11		4	
Silica	0.5 mg/L	5.0		8.3	
o-Phosphate (as P)	0.01 mg/L	<0.01		<0.01	
Nitrate + Nitrite (as N)	0.05 mg/L	0.56		0.11	
Ammonia (as N)	0.05 mg/L	0.25		0.23	
Iron	0.02 mg/L	0.06	2.0	0.05	1.6
Manganese	0.01 mg/L	0.03	0.50	0.04	0.14
Copper	0.01 mg/L	<0.01	0.02	<0.01	0.01
Zinc	0.01 mg/L	0.01	0.04	0.01	0.04
Colour (true)	0.5 T.C.U.	4		5	
Turbidity	0.1 N.T.U.	>1000		99	
Conductivity (25°C)	0.1 umho/cm	660		640	
pH	0.01	7.5		7.5	
Total Organic Carbon	0.5 mg/L	5.4		2.6	
Cation Sum	0.01 meq/L	5.81		6.43	
Anion Sum	0.01 meq/L	5.61		6.25	
Ion Ratio	0.01	1.04		1.03	
% Difference	0.1 %	1.8		1.4	
TDS (ion sum, calc)	0.1 mg/L	315		323	
Conductivity (calc, 25°C)	0.1 umho/cm	598		618	
Saturation pH (4°C)	0.01	7.54		7.36	
Langelier Index (4°C)	0.01	-0.04		0.14	
Bicarbonate (as $CaCO_3$)	1.0 mg/L	189		279	
Carbonate (as $CaCO_3$)	1.0 mg/L	0.6		0.8	

NOTE: ALL RESULTS BASED ON SAMPLE CENTRIFUGED AT 2000 RPM FOR 30 MINUTES EXCEPT pH, TURBIDITY, CONDUCTIVITY AND `TOTAL METALS' (IRON, MANGANESE, COPPER AND ZINC)

ALL RESULTS BASED ON UNPRESERVED SAMPLE AS SUBMITTED EXCEPT FOR IRON, MANGANESE, COPPER AND ZINC (NITRIC ACID TO pH <2).

REPORT TO: GARTNER LEE LIMITED
PROJECT #:88-237
LAB.#:882315
TABLE #1H

RCAp CHEMICAL PARAMETERS	METHOD DETECTION LIMIT	#BH 5 Water Soluble	#BH 5 'Total' Metals	#BH 6 Water Soluble	#BH 6 'Total' Metals
Sodium	0.5 mg/L	8.8		0.6	
Potassium	0.1 mg/L	1.2		0.4	
Calcium	0.005 mg/L	36		75	
Magnesium	0.001 mg/L	8.3		3.6	
Hardness (as $CaCO_3$)	0.05 mg/L	124		202	
Alkalinity (as $CaCO_3$)	1.0 mg/L	85		195	
Sulphate	1.0 mg/L	26		11	
Chloride	1.0 mg/L	25		2	
Silica	0.5 mg/L	0.8		4.8	
o-Phosphate (as P)	0.01 mg/L	<0.01		<0.01	
Nitrate + Nitrite (as N)	0.05 mg/L	0.24		<0.05	
Ammonia (as N)	0.05 mg/L	0.19		<0.05	
Iron	0.02 mg/L	0.02	0.03	0.04	1.7
Manganese	0.01 mg/L	0.01	<0.01	0.06	0.25
Copper	0.01 mg/L	0.01	0.01	<0.01	<0.01
Zinc	0.01 mg/L	0.01	<0.01	<0.01	0.01
Colour (true)	0.5 T.C.U.	<3		18	
Turbidity	0.1 N.T.U.	15		290	
Conductivity (25°C)	0.1 umho/cm	300		430	
pH	0.01	7.6		7.3	
Total Organic Carbon	0.5 mg/L	2.6		3.5	
Cation Sum	0.01 meq/L	2.92		4.09	
Anion Sum	0.01 meq/L	2.96		4.19	
Ion Ratio	0.01	0.99		0.98	
% Difference	0.1 %	0.7		1.2	
TDS (ion sum, calc)	0.1 mg/L	158		215	
Conductivity (calc, 25°C)	0.1 umho/cm	316		402	
Saturation pH (4°C)	0.01	8.25		7.58	
Langelier Index (4°C)	0.01	-0.65		-0.28	
Bicarbonate (as $CaCO_3$)	1.0 mg/L	85		195	
Carbonate (as $CaCO_3$)	1.0 mg/L	0.3		0.4	

NOTE: ALL RESULTS BASED ON SAMPLE CENTRIFUGED AT 2000 RPM FOR 30 MINUTES EXCEPT pH, TURBIDITY, CONDUCTIVITY AND 'TOTAL METALS' (IRON, MANGANESE, COPPER AND ZINC)

ALL RESULTS BASED ON UNPRESERVED SAMPLE AS SUBMITTED EXCEPT FOR IRON, MANGANESE, COPPER AND ZINC (NITRIC ACID TO pH <2).

REPORT TO: GARTNER LEE LIMITED
PROJECT #:88-237
LAB.#:882315
TABLE #1I

RCAp CHEMICAL PARAMETERS	METHOD DETECTION LIMIT	#Q 1 Water Soluble	#Q 1 'Total' Metals	#R 2 Water Soluble	#R 2 'Total' Metals
Sodium	0.5 mg/L	15		1.5	
Potassium	0.1 mg/L	3.7		0.7	
Calcium	0.005 mg/L	82		9	
Magnesium	0.001 mg/L	18		1.8	
Hardness (as $CaCO_3$)	0.05 mg/L	279		29	
Alkalinity (as $CaCO_3$)	1.0 mg/L	140		19	
Sulphate	1.0 mg/L	150		11	
Chloride	1.0 mg/L	19		3	
Silica	0.5 mg/L	1.5		1.4	
o-Phosphate (as P)	0.01 mg/L	0.07		<0.01	
Nitrate + Nitrite (as N)	0.05 mg/L	2.5		<0.05	
Ammonia (as N)	0.05 mg/L	0.10		0.05	
Iron	0.02 mg/L	0.05	0.07	0.04	0.07
Manganese	0.01 mg/L	0.02	0.01	0.01	0.02
Copper	0.01 mg/L	<0.01	<0.01	0.01	0.01
Zinc	0.01 mg/L	0.01	0.01	0.01	0.01
Colour (true)	0.5 T.C.U.	<3		11	
Turbidity	0.1 N.T.U.	2.4		1.1	
Conductivity (25°C)	0.1 umho/cm	740		73	
pH	0.01	8.0		7.5	
Total Organic Carbon	0.5 mg/L	4.7		4.6	
Cation Sum	0.01 meq/L	6.35		0.67	
Anion Sum	0.01 meq/L	6.64		0.69	
Ion Ratio	0.01	0.96		0.97	
% Difference	0.1 %	2.2		1.5	
TDS (ion sum, calc)	0.1 mg/L	384		40	
Conductivity (calc, 25°C)	0.1 umho/cm	729		74	
Saturation pH (4°C)	0.01	7.70		9.49	
Langelier Index (4°C)	0.01	0.30		-1.99	
Bicarbonate (as $CaCO_3$)	1.0 mg/L	139		19	
Carbonate (as $CaCO_3$)	1.0 mg/L	1.3		0.1	

NOTE: ALL RESULTS BASED ON SAMPLE CENTRIFUGED AT 2000 RPM FOR 30 MINUTES EXCEPT pH, TURBIDITY, CONDUCTIVITY AND `TOTAL METALS' (IRON, MANGANESE, COPPER AND ZINC)

ALL RESULTS BASED ON UNPRESERVED SAMPLE AS SUBMITTED EXCEPT FOR IRON, MANGANESE, COPPER AND ZINC (NITRIC ACID TO pH <2).

REPORT TO: GARTNER LEE LIMITED
PROJECT #:88-237
LAB.#:882315
TABLE #1J

RCAp CHEMICAL PARAMETERS	METHOD DETECTION LIMIT	#R 3 Water Soluble	#R 3 'Total' Metals	#R 4 Water Soluble	#R 4 'Total' Metals
Sodium	0.5 mg/L	1.8		1.3	
Potassium	0.1 mg/L	0.6		0.5	
Calcium	0.005 mg/L	9		8	
Magnesium	0.001 mg/L	1.7		1.7	
Hardness (as $CaCO_3$)	0.05 mg/L	30		26	
Alkalinity (as $CaCO_3$)	1.0 mg/L	21		16	
Sulphate	1.0 mg/L	10		10	
Chloride	1.0 mg/L	3		3	
Silica	0.5 mg/L	1.4		1.4	
o-Phosphate (as P)	0.01 mg/L	<0.01		<0.01	
Nitrate + Nitrite (as N)	0.05 mg/L	<0.05		<0.05	
Ammonia (as N)	0.05 mg/L	<0.05		<0.05	
Iron	0.02 mg/L	0.04	0.30	0.03	0.04
Manganese	0.01 mg/L	0.01	0.05	0.01	0.01
Copper	0.01 mg/L	<0.01	<0.01	<0.01	<0.01
Zinc	0.01 mg/L	<0.01	<0.01	<0.01	<0.01
Colour (true)	0.5 T.C.U.	12		11	
Turbidity	0.1 N.T.U.	4		0.6	
Conductivity (25°C)	0.1 umho/cm	76		65	
pH	0.01	7.9		7.4	
Total Organic Carbon	0.5 mg/L	4.2		4.1	
Cation Sum	0.01 meq/L	0.70		0.59	
Anion Sum	0.01 meq/L	0.71		0.60	
Ion Ratio	0.01	0.99		0.98	
% Difference	0.1 %	0.7		0.8	
TDS (ion sum, calc)	0.1 mg/L	40		35	
Conductivity (calc, 25°C)	0.1 umho/cm	75		65	
Saturation pH (4°C)	0.01	9.42		9.62	
Langelier Index (4°C)	0.01	-1.52		-2.22	
Bicarbonate (as $CaCO_3$)	1.0 mg/L	21		16	
Carbonate (as $CaCO_3$)	1.0 mg/L	0.2		0.0	

NOTE: ALL RESULTS BASED ON SAMPLE CENTRIFUGED AT 2000 RPM FOR 30 MINUTES EXCEPT pH, TURBIDITY, CONDUCTIVITY AND `TOTAL METALS' (IRON, MANGANESE, COPPER AND ZINC)

ALL RESULTS BASED ON UNPRESERVED SAMPLE AS SUBMITTED EXCEPT FOR IRON, MANGANESE, COPPER AND ZINC (NITRIC ACID TO pH <2).

GEN-V

CLIENT: GARTNER & LEE ASSOCIATES
REF. NO.: 882315
TABLE: 2

CHEMICAL PARAMETERS - GENERAL

SAMPLE IDENTIFICATION	PHENOLS mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
H1	<0.002							
H2	<0.002							
H3	0.006							
H4	<0.002							
H5	0.003							
H6	0.003							
H7	0.003							
H8	<0.002							
H9	<0.002							
BH1-D 1-I	<0.002							
BH1-S 1-II	<0.002							
BH2-D 2-I	0.006							
BH3-D 3-I	0.003							
BH4	0.003							
BH5	0.003							
BH6	<0.002							
Q1	<0.002							
R2	<0.002							
R3	<0.002							
R4	<0.002							

QA/QC PROTOCOL

0.0288	0.0275							
TRUE VALUE								
TRUE VALUE								
TRUE VALUE								
MDL								

MDL = INSTRUMENT/METHOD DETECTION LIMIT
NS = NON SUFFICIENT SAMPLE
-- = NO ANALYSIS REQUIRED

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NEW ADDRESS:
UNIT #6
400 MATHESON BLVD. EAST
MISSISSAUGA, ONT. L4Z 1N8

CLIENT: Gartner Lee Limited
140 Renfrew Drive
Markham, Ontario
L3R 8B6

REPORT #: MA01902-1905

CUSTOMER REF.#88-237

ATTN: Mr. Rob Dickin

DATE SUBMITTED: Nov 15/88

----------CERTIFICATE OF ANALYSIS----------

Sample Description: WATER

Preparation: Samples were prepared as recommended in APHA Standard Methods for the Examination of Water and Wastewater, 16th Edition, 1985 unless otherwise noted.

Methodology: Rapid Chemical Analysis program (RCAp)

Chemical Results: See Tables 1A and 1B

Note: If you require further information, please contact Nora Macnee at (416) 890-2555.

DATE: January 23, 1989

J. Dale

CERTIFIED BY:
Jim Dale, M.Sc.
Manager, RCAp

REPORT TO: GARTNER LEE LIMITED
PROJECT #:88-237
LAB.#:MA01902-1903
TABLE #1A

RCAp CHEMICAL PARAMETERS	METHOD DETECTION LIMIT	SAMPLE #BH 2-II Water Soluble	SAMPLE #BH 2-II 'Total' Metals	SAMPLE #BH 3-II Water Soluble	SAMPLE #BH 3-II 'Total' Metals
Sodium	0.5 mg/L	25		25	
Potassium	0.1 mg/L	2.1		23	
Calcium	0.005 mg/L	64		137	
Magnesium	0.001 mg/L	5.7		14	
Hardness (as $CaCO_3$)	0.05 mg/L	185		404	
Alkalinity (as $CaCO_3$)	1.0 mg/L	199		294	
Sulphate	1.0 mg/L	49		176	
Chloride	1.0 mg/L	3.0		10	
Silica	0.5 mg/L	4.2		5.6	
o-Phosphate (as P)	0.01 mg/L	<0.01		<0.01	
Nitrate + Nitrite (as N)	0.05 mg/L	0.22		4.6	
Ammonia (as N)	0.05 mg/L	<0.05		<0.05	
Iron	0.02 mg/L	0.03	0.09	0.03	0.97
Manganese	0.01 mg/L	0.03	0.03	0.04	0.13
Copper	0.01 mg/L	0.01	0.01	0.01	0.01
Zinc	0.01 mg/L	0.01	0.01	0.03	0.04
Colour (true)	0.5 T.C.U.	5		<3	
Turbidity	0.1 N.T.U.	13		17	
Conductivity (25°C)	0.1 umho/cm	522		1098	
pH	0.01	8.0		7.6	
Total Organic Carbon	0.5 mg/L	2.0		5.6	
Cation Sum	0.01 meq/L	4.86		9.76	
Anion Sum	0.01 meq/L	5.09		10.12	
Ion Ratio	0.01	0.95		0.97	
% Difference	0.1 %	2.4		1.8	
TDS (ion sum, calc)	0.1 mg/L	396		769	
Conductivity (calc, 25°C)	0.1 umho/cm	505		1080	
Saturation pH (4°C)	0.01	7.77		7.31	
Langelier Index (4°C)	0.01	0.23		0.29	
Bicarbonate (as $CaCO_3$)	1.0 mg/L	197		292	
Carbonate (as $CaCO_3$)	1.0 mg/L	1.9		1.1	

NOTE: ALL RESULTS BASED ON SAMPLE CENTRIFUGED AT 2000 RPM FOR 30 MINUTES EXCEPT pH, TURBIDITY, CONDUCTIVITY AND `TOTAL METALS' (IRON, MANGANESE, COPPER AND ZINC)

ALL RESULTS BASED ON UNPRESERVED SAMPLE AS SUBMITTED EXCEPT FOR IRON, MANGANESE, COPPER AND ZINC (NITRIC ACID TO pH <2).

REPORT TO: GARTNER LEE LIMITED
PROJECT #:88-237
LAB.#:MA01904-1905
TABLE #1B

RCAp CHEMICAL PARAMETERS	METHOD DETECTION LIMIT	SAMPLE #BH 4 Water Soluble	SAMPLE #BH 4 'Total' Metals	SAMPLE #SW A Water Soluble	SAMPLE #SW A 'Total' Metals
Sodium	0.5 mg/L	3.3		10	
Potassium	0.1 mg/L	11		4.0	
Calcium	0.005 mg/L	117		104	
Magnesium	0.001 mg/L	10		3.0	
Hardness (as $CaCO_3$)	0.05 mg/L	334		273	
Alkalinity (as $CaCO_3$)	1.0 mg/L	321		294	
Sulphate	1.0 mg/L	33		18	
Chloride	1.0 mg/L	1.0		<1.0	
Silica	0.5 mg/L	6.5		4.0	
o-Phosphate (as P)	0.01 mg/L	<0.01		<0.01	
Nitrate + Nitrite (as N)	0.05 mg/L	0.74		<0.05	
Ammonia (as N)	0.05 mg/L	0.09		<0.05	
Iron	0.02 mg/L	0.02	3.20	0.02	0.03
Manganese	0.01 mg/L	0.06	0.28	0.04	0.04
Copper	0.01 mg/L	0.01	0.07	0.01	0.01
Zinc	0.01 mg/L	0.08	0.16	0.01	0.01
Colour (true)	0.5 T.C.U.	<3		5	
Turbidity	0.1 N.T.U.	72		0.6	
Conductivity (25°C)	0.1 umho/cm	766		570	
pH	0.01	7.6		7.7	
Total Organic Carbon	0.5 mg/L	2.0		3.7	
Cation Sum	0.01 meq/L	7.12		5.99	
Anion Sum	0.01 meq/L	7.19		6.24	
Ion Ratio	0.01	0.99		0.96	
% Difference	0.1 %	0.5		2.1	
TDS (ion sum, calc)	0.1 mg/L	576		500	
Conductivity (calc, 25°C)	0.1 umho/cm	708		595	
Saturation pH (4°C)	0.01	7.32		7.41	
Langelier Index (4°C)	0.01	0.28		0.29	
Bicarbonate (as $CaCO_3$)	1.0 mg/L	320		292	
Carbonate (as $CaCO_3$)	1.0 mg/L	1.2		1.4	

NOTE: ALL RESULTS BASED ON SAMPLE CENTRIFUGED AT 2000 RPM FOR 30 MINUTES EXCEPT pH, TURBIDITY, CONDUCTIVITY AND `TOTAL METALS' (IRON, MANGANESE, COPPER AND ZINC)

ALL RESULTS BASED ON UNPRESERVED SAMPLE AS SUBMITTED EXCEPT FOR IRON, MANGANESE, COPPER AND ZINC (NITRIC ACID TO pH <2).

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RECEIVED JAN 6 1989 GARTNER LEE RCD

CUSTOMER: Gartner Lee Limited
140 Renfrew Drive
Suite 102
Markham, Ontario
L3R 8B6

REPORT #: 883893

CUSTOMER REF.# 88-237

ATTN: Mr. Rob Dickin

DATE SUBMITTED: Nov. 17, 1988

---------- CERTIFICATE OF ANALYSIS ----------

Sample Description: WATER

Preparation: Samples were prepared as recommended in APHA Standard methods for the examination of water and wastewater, 16th Edition, 1985 or MOE Handbook of analytical methods for environmental samples, 1983.

Note: Additional information is available on request.

Methodology:

Conventionals - wet chemical techniques.

Chemical Results: See Table 1.

DATE: Dec. 21, 1988

CERTIFIED BY:
Jim Forrester,
Manager, Inorganic Dept.

Members: Association of Official Racing Chemists, American Chemical Society, Canadian Society of Forensic Science, Chemical Institute of Canada, American Society for Testing and Materials, Canadian Federation of Independent Business, Better Business Bureau, Association of the Chemical Profession of Ontario, Association of Professional Engineers of the Province of Ontario, Canadian Association of Fire Chiefs, American Industrial Hygiene Association, Air Pollution Control Association, Canadian Society of Safety Engineering, International Society for Respiratory Protection

3893-1

CLIENT: GARTNER LEE LIMITED
REF. NO.: 883893
TABLE: 1

CHEMICAL ANALYSIS - GENERAL
CONC = mg/L UNLESS OTHERWISE NOTED

CHEMICAL PARAMETERS	MDL (mg/L)	QA/QC (mg/L) EXP'T	TRUE	BH2-II	BH3-II	BH4		
Phenol	0.002	0.028	0.029(e)	<0.002	<0.002	<0.002		

MDL = INSTRUMENT/METHOD DETECTION LIMIT
NS = NON SUFFICIENT SAMPLE
-- = NO ANALYSIS REQUIRED

a= EPA WP 1083 ICAP 19/7
b= EPA WP 386 TRACE METALS - I
c= NBS 1643b TRACE ELEMENTS IN WATER
d= EPA WP 1185+WS 378 MINERALS +NO3/F-6
e= OTHER

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CUSTOMER: Gartner Lee Limited
140 Renfrew Drive
Suite 102
Markham, Ontario
L3R 6B3

ENV-003

ATTN: Mr. Rob Dicken

REPORT #: 882319 CUSTOMER REF.#

DATE SUBMITTED: Aug. 25, 1988 DATE REPORTED: Sept. 28/88

---------- CERTIFICATE OF ANALYSIS ----------

Sample Description: WATER

Analysis Performed: VOLATILE ORGANIC ANALYSIS

Protocol based upon U.S. EPA Method #624. Samples are fortified with isotopically labelled internal standards and analyzed by purge and trap gas chromatography/mass spectrometry (PT-GC/MS).

Note: **Additional information is available on request.**

Instrumentation:

- Envirochem 810 purge and trap concentrator.
- Finnigan 3200 GC/MS-DS.

Chemical Results: See Table V-1.

CERTIFIED BY:
Nellie Sio, B. Tech
Project Leader-Volatile Organics

WITNESSED BY:
Tim Munshaw, M.Sc. C.Chem.
Manager, Environmental Dept.

* Refer inquiries to.

Members: Association of Official Racing Chemists, American Chemical Society, Canadian Society of Forensic Science, Chemical Institute of Canada, American Society for Testing and Materials, Canadian Federation of Independent Business, Better Business Bureau, Association of the Chemical Profession of Ontario, Association of Professional Engineers of the Province of Ontario, Canadian Association of Fire Chiefs, American Industrial Hygiene Association, Air Pollution Control Association, Canadian Society of Safety Engineering, International Society for Respiratory Protection.

2319-V-1

VOLATILE ORGANICS
Conc. = (ppb)

GARTNER LEE LIMITED
W.O. #882319

VOLATILE COMPOUNDS	MDL (ppb)	TRAVELLING BLANK	BH-4		
DICHLORODIFLUOROMETHANE	2.0	--	--	--	--
CHLOROMETHANE	2.0	--	--	--	--
VINYL CHLORIDE	2.0	--	--	--	--
BROMOMETHANE	2.0	--	--	--	--
CHLOROETHANE	2.0	--	--	--	--
TRICHLOROFLUOROMETHANE	2.0	--	--	--	--
1,1-DICHLOROETHYLENE	1.0	--	--	--	--
DICHLOROMETHANE	1.0	4.24	--	--	--
T-1,2-DICHLOROETHYLENE	1.0	--	--	--	--
1,1-DICHLOROETHANE	1.0	--	--	--	--
CHLOROFORM	1.0	TR	--	--	--
1,2-DICHLOROETHANE	1.0	--	--	--	--
1,1,1-TRICHLOROETHANE	1.0	--	--	--	--
BENZENE	0.5	TR	TR	--	--
CARBON TETRACHLORIDE	1.0	--	--	--	--
1,2-DICHLOROPROPANE	1.0	--	--	--	--
BROMODICHLOROMETHANE	1.0	--	--	--	--
TRICHLOROETHYLENE	1.0	--	--	--	--
1,3-DICHLOROPROPENE(Z)	1.0	--	--	--	--
1,3-DICHLOROPROPENE(E)	1.0	--	--	--	--
1,1,2-TRICHLOROETHANE	1.0	--	--	--	--
TOLUENE	0.5	--	--	--	--
DIBROMOCHLOROMETHANE	1.0	--	--	--	--
TETRACHLOROETHYLENE	1.0	--	--	--	--
CHLOROBENZENE	0.5	--	--	--	--
ETHYL BENZENE	0.5	--	--	--	--
P & M XYLENE	0.5	--	--	--	--
BROMOFORM	1.0	--	--	--	--
O-XYLENE	0.5	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	1.0	--	--	--	--
1,3-DICHLOROBENZENE	1.0	--	--	--	--
1,4-DICHLOROBENZENE	1.0	--	TR	--	--
1,2-DICHLOROBENZENE	1.0	--	--	--	--
CIS-1,2-DICHLOROETHYLENE	1.0	--	--	--	--
SURROGATE % RECOVERY					
4-BROMOFLUOROBENZENE		119.12%	80.81%		

TR = TRACE AMOUNT DETECTED
-- = NONE DETECTED
MDL = METHOD DETECTION LIMIT

ANALYST [illegible], Sept 28/88

BARRINGER MAGENTA
304 CARLINGVIEW DRIVE
REXDALE, ONTARIO
M9W 5G2
(416) 675-3870

FILE: T8_4653
DATE: 01/12/88
MATRIX: AQUEOUS

GARTNER-LEE LTD (ROB DICKIN) PROJ:88-237 WO NO: 88-4653

SAMPLE ID	AG MG/L	AL MG/L	B MG/L	BA MG/L	BE MG/L	CA MG/L	CD MG/L	CO MG/L	CR MG/L
SAMPLE 4-A	<.005	<.01	.103	.066	<.0005	115	<.01	<.05	<.01
CONTROL DATA	--	--	--	--	--	--	--	--	--
BLANK	<.005	<.01	<.004	<.005	<.0005	.04	<.01	<.05	<.01
SAMPLE 4-A	<.005	<.01	.103	.066	<.0005	115	<.01	<.05	<.01
SAMPLE 4-A-R	<.005	<.01	.107	.065	<.0005	114	<.01	<.05	<.01
CONTROL STD	.007	.95	.207	1.01	.0184	.10	.19	.17	.20
CONTROL.EST.	--	1.00	.200	--	.0200	--	.20	.20	.20
EPA STD	.005	<.01	.107	<.005	<.0005	39.3	<.01	<.05	.01
EPA.STD(CRT)	--	--	--	--	--	40.0	--	--	--

SAMPLE ID	CU MG/L	FE MG/L	K MG/L	MG MG/L	MN MG/L	MO MG/L	NA MG/L	NI MG/L	P MG/L
SAMPLE 4-A	<.008	.04	12.8	10.6	.05	<.2	3.6	<.05	<.5
CONTROL DATA	--	--	--	--	--	--	--	--	--
BLANK	<.008	<.01	<.5	<.01	<.01	<.2	<.5	<.05	<.5
SAMPLE 4-A	<.008	.04	12.8	10.6	.05	<.2	3.6	<.05	<.5
SAMPLE 4-A-R	<.008	.06	12.8	10.6	.05	<.2	3.6	.05	<.5
CONTROL STD	.195	.97	<.5	<.01	.19	<.2	<.5	.20	<.5
CONTROL.EST.	.200	1.00	--	--	.20	--	--	.20	--
EPA STD	<.008	.05	9.9	10.3	<.01	<.2	40.8	<.05	<.5
EPA.STD(CRT)	--	--	10.0	10.0	--	--	40.0	--	--

SAMPLE ID	PB MG/L	SI MG/L	SR MG/L	TH MG/L	TI MG/L	V MG/L	ZN MG/L	ZR MG/L
SAMPLE 4-A	<.05	2.99	.716	<.05	<.005	.013	.09	<.05
CONTROL DATA	--	--	--	--	--	--	--	--
BLANK	<.05	<.05	<.001	<.05	<.005	<.005	<.01	<.05
SAMPLE 4-A	<.05	2.99	.716	<.05	<.005	.013	.09	<.05
SAMPLE 4-A-R	<.05	2.91	.703	<.05	<.005	.013	.10	<.05
CONTROL STD	1.98	<.05	.196	<.05	.190	.196	.20	.18
CONTROL.EST.	2.00	--	.200	--	.200	.200	.20	.20
EPA STD	--	.46	.021	<.05	<.005	.008	.02	<.05
EPA.STD(CRT)	--	--	--	--	--	--	--	--